US Rates Weekly

Tax cuts and the next act

- **Overview —** The rates market pricing after Powell's announcement is in line with our projections from two weeks ago. The proposed tax plan will be challenged by various constituencies over the next few weeks and potentially months. Treasury supply will inevitably increase as the deficit increases.
- **Treasury RV —** The last four 10y refunding auctions had significant tails, likely driven by weak foreign demand. We fit a simple model which implies next week's 10y auction may disappoint.
- **Swap Spreads—** We continue to like front-end OIS/Tsy tighteners due to our expectations of increased supply in the front end, but see better value in 3s at this time. We think 30y spreads may be a touch wide to fair value and may be set for a near-term retracement. We like buying 10y spreads vs OIS/1.375 Oct 20 tighteners to express our view on a steeper spreads curve.
- **Short End—** Supply is at the forefront in 2018. Funding needs from private investors are increasing by more than x2 for 2018. We expect much of the issuance to be filled at the front-end (bills, <5y coups) starting from next Feb. We expect short-end funding pressures to build around Feb-April.
- **TIPS—** We are short term bullish on 5y breakevens. We examine the correlation between the NY Fed's UIG and core inflation.
- **ARRC—** The ARRC has adopted an accelerated timeline for the development of the SOFR-based derivatives market. We believe the timeline is too optimistic and continue to think LIBOR will continue to be published well beyond 2021. The introduction of term SOFR rates only late in the process may be a problem for the broad adoption of SOFR derivatives.

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With thanks to
Utkarsh Saddi

Contents

Summary of Rate Expectations	3
Overview: Tax cuts and the next act	4
Treasury RV: 10y refunding on the ropes	7
Swaps: TBAC and Powell shake spreads	9
Short End: 2018 UST Supply Outlook	12
TIPS: Short term bullish	16
LIBOR: ARRC broadens mandate	18
US Rates Strategy Model Portfolio Update	21
Appendix I: Model Portfolio Closed Trades	23
Appendix II: Market Rate Hike Expectations	24
Appendix III: Treasury Relative Value	25
Appendix IV: Swap Fly Relative Value	26
Appendix V: Front End Monitor	27
Appendix VI: Event Calendar	28
Appendix A-1	29

Summary of Rate Expectations

Figure 1. Summary of views

US Rates	View	Recommended Positions
Duration	Neutral	None
Yield Curve	Neutral	None
Swap Spreads	Neutral	None
Gamma	Long	Long forward vol
Vega	Long	Long 10y10y straddles
Inflation	Wider	Long 5y BEs, Long 3y TIPS on ASW
Front end	Neutral	1y1y JPYUSD XCCY Widener

Source: Citi Research

Figure 2. Rates Forecasts

Quarter End	2-Nov	4Q 17	1Q18	2Q18
INTEREST RATE FORECASTS				
Policy Rate (IOER)	1.25	1.50	1.75	2.00
3-Month Libor	1.38	1.60	1.90	2.15
2 Year Treasury Yield	1.61	1.50	1.65	1.75
5 Year Treasury Yield	2.01	1.95	2.00	2.10
10 Year Treasury Yield	2.36	2.40	2.45	2.45
30 Year Treasury Yield	2.85	2.95	3.00	3.00
2Y Swap Spread (Swap Less Govt) bp	22	20	20	18
10Y Swap Spread (Swap Less Govt) bp	-2	0	0	0
30Y Swap Spread (Swap Less Govt) bp	-26	-28	-27	-25
INFLATION FORECAST				
10 Year Breakeven Inflation	189	175	180	200

Source: Citi Research

Figure 3. 2017 Supply forecasts

	FRN	Nominal Treasuries						TIPS			Gross	Redemption			Fed	Net Supply to
2017	2y	2yr	3yr	5yr	7yr	10yr	30yr	5y	10y	30y	Supply	Nominals	TIPS	FRNs	Reinvestment/ Add-on	Private Market
Jan-17	15	26	24	34	28	20	12		13		**172**	124	21	41	**10**	**-3**
Feb-17	13	26	24	34	28	23	15			7	**170**	146			**20**	**44**
Mar-17	13	26	24	34	28	20	12		11		**168**	125			**14**	**57**
Apr-17	15	26	24	34	28	20	12	16			**175**	125	47	41	**14**	**-23**
May-17	13	26	24	34	28	23	15		11		**174**	163			**32**	**44**
Jun-17	13	26	24	34	28	20	12			5	**162**	120			**13**	**55**
Jul-17	15	26	24	34	28	20	12		13		**172**	118	16	41	**12**	**9**
Aug-17	13	26	24	34	28	23	15	14			**177**	157			**22**	**42**
Sep-17	13	26	24	34	28	20	12		11		**168**	118			**11**	**61**
Oct-17	15	26	24	34	28	20	12			5	**164**	118		41	**9**	**14**
Nov-17	13	26	24	34	28	23	15		11		**174**	145			**19**	**48**
Dec-17	13	26	24	34	28	20	12	14			**171**	116			**18**	**72**
Total	**164**	**312**	**288**	**408**	**336**	**252**	**156**	**44**	**70**	**17**	**2,047**	**1575**	**84**	**164**	**194**	**418**

Source: Citi Research

Note: The nominal redemption column includes redemptions from the SOMA portfolio. Excluding the Fed, net marketable supply to the private sector is 224 + 194 = 418bn. TIPS redemptions include 10bn in inflation compensation accrual.

Overview: Tax cuts and the next act

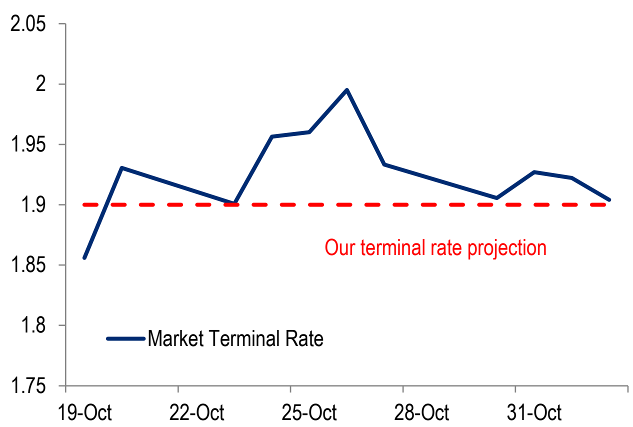
Jabaz Mathai
Steve Kang
Jason Williams

The rates market pricing after Powell's announcement is in line with our projections from two weeks ago. The proposed tax plan will be challenged by various constituencies over the next few weeks and potentially months. Treasury supply will inevitably increase as the deficit increases.

Powell is crowned

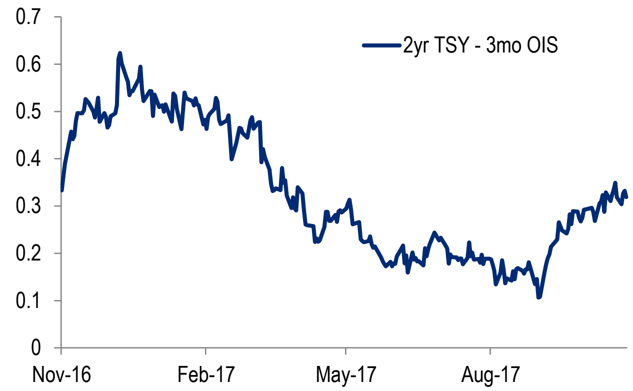
Yesterday, one key source of uncertainty was finally resolved with the official announcement of Powell as the next Fed chair effective in February 2018. The market response was close to our expectations of the Powell scenario as laid out in US Rates Weekly: With Jay Powell comes rate responsibility (Figure 4). The outcome serves to solidify continuity of the current monetary policy regime implying the gradual pace of tightening will not materially change with the market pricing the terminal rate (3y1m OIS) in line with our expectations near 1.9%. In our view, this implies that the front-end of the curve will remain anchored as the 2y note will likely remain tight to Fed funds (Figure 5). Powell also may have been given the nod as the new Fed chair as a green light for faster deregulation in the banking sector. This may put upward pressure on longer end swap spreads, although some deregulation is already priced in- see the swaps section for more details.

Figure 4. Rates market response to Powell in line with our projections with the terminal rate near 1.9%



Source: Citi Research

Figure 5. The 2y-OIS spread should continue trading tight on monetary policy continuity



Source: Citi Research

Supply turning higher

The outcome of the TBAC refunding meeting this week turned out be in line with our forecasts – no increase in coupon supply this year and higher coupon (and bill) supply starting early next year. Citi's deficit forecasts is on the higher side of consensus, and supply in our view will end up being even higher, especially with the realization of a more generous tax cut plan.

The key takeaways from TBAC were: more front-end (2y/3y) issuance and bills expected. Obviously larger bill issuance would tighten OIS/bill spreads and OIS/GC spreads. The front-end UST spreads are likely to tighten from tightening in OIS/GC and increase in offering sizes. As for the trade, we recommend 3Y OIS/UST tightener, paired with 10Y swap spreads widener. Please look at spreads section for more details.

Figure 6. Citi 2018 UST issuance forecast

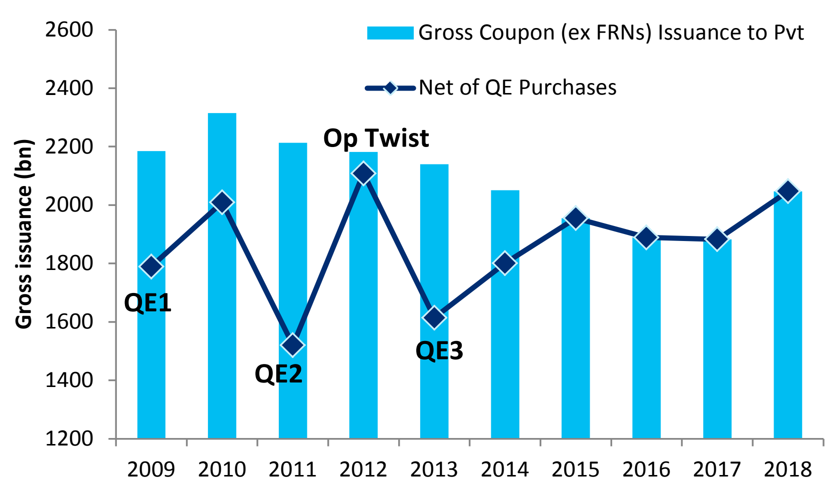
2018	FRN 2y	Nominal Treasuries 2yr	3yr	5yr	7yr	10yr	30yr	TIPS 5y	10y	30y	Gross Supply	Total Redemption Nominals	TIPS	FRNs	Fed Maturity	Net Supply to Pvt
Jan-18	15	26	24	34	28	20	12	0	13	0	172	115	19	41	30	27
Feb-18	15	28	26	35	29	24	16	0	0	7	180	163			49	65
Mar-18	15	30	28	35	29	21	13	0	11	0	182	121			31	92
Apr-18	17	32	30	35	29	21	13	16	0	0	193	123	52	45	35	8
May-18	15	32	30	35	29	24	16	0	11	0	192	158			55	89
Jun-18	15	32	30	35	29	21	13	0	0	5	180	119			30	92
Jul-18	17	32	30	35	29	21	13	0	13	0	190	117	17	43	30	44
Aug-18	15	32	30	35	29	24	16	14	0	0	195	154			44	85
Sep-18	15	32	30	35	29	21	13	0	11	0	186	116			17	87
Oct-18	17	32	30	35	29	21	13	0	0	5	182	117		42	23	46
Nov-18	15	32	30	35	29	24	16	0	11	0	192	176			62	78
Dec-18	15	32	30	35	29	21	13	14	0	0	189	118			17	88
Total	186	372	348	419	347	263	167	44	70	17	2,233	1597	88	171	424	801

Source: Citi Research

With a dramatic increase in funding needs from private investors for 2018, we expect the Treasury to deliver a coupon hike in February. Our expectations are in-line with TBAC's recommendation, $2bn quarterly increase in FRNs, $2bn monthly increase in 2y/3y and $1bn increase in 5y-30y (Figure 6) for Feb-May. We don't expect an increase in TIPS as the continual drop in long-end breakevens (5y5y currently at 180bp, lower than "symmetric" inflation target by the Fed and economists' inflation expectations) signals lessoned demand for TIPS. No further coupon hikes are necessary beyond this point, in our view.

Annual gross nominal/TIPS issuances to private investors are rising by $160bn to get to near the highest gross issuance since the crisis (Figure 7). The composition <5y coupons are likely to be greater as we expect more issuance are expected in those sectors. We are positioning for this with 3Y OIS/UST tightener with 10y swap spreads widener.

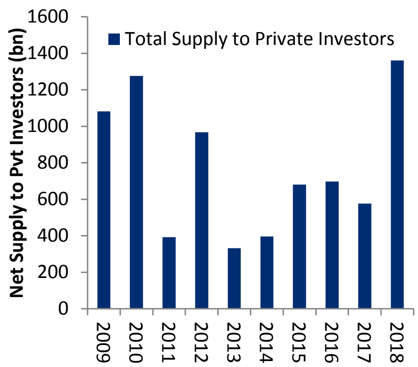
Figure 7. Gross issuance to private investors are expected to increase in 2018, likely to cause a tightening in spreads



Source: Citi Research

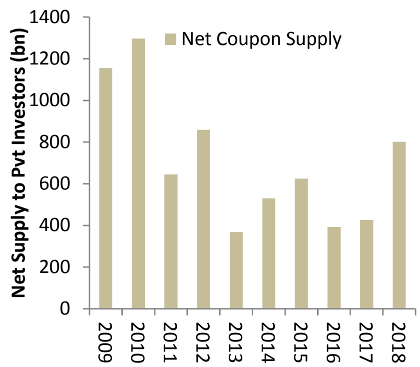
The real story is on bill issuance, which we expect to increase by $600bn by the end of next year. In terms of net issuance (Figure 8, Figure 9, Figure 10), 3M/1M bill, which is trading 15bp through FF OIS, is likely to cheapen to trade around -5bp against OIS. 3M OIS/GC is also likely to cheapen by 10bp by the end of next year with this much of supply.

Figure 8. Net issuance to private investors



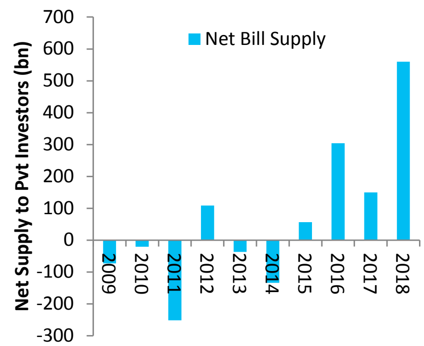
Source: Citi Research

Figure 9. Net coupon issuance to private



Source: Citi Research

Figure 10. Net bill issuance to private



Source: Citi Research

Tax reform comes to the forefront

This week Kevin Brady, Chairman of the House Ways and Means Committee, released the Tax Cuts and Jobs Act[1] (see our economists view in US Economics View: Tax Reform Countdown – House $1.5 Trillion Tax Bill: First Draft). The bill is similar to previous proposals, specifically in cost, at $1.5tn over the next ten years. Despite this showing a sign of progress by the Republicans the Treasury curve was little changed with Treasuries slightly richening after the announcement.

Given the package is in line with our previous deficit assumptions, $1.5tn over 10yr, our previous estimates of tax reform's total positive impact on the 5y5y rate remains at about +30bp (see US Rates Weekly: Let's Get Fiscal). In our view, risks remain to the upside in yields given fiscal is likely only priced in ~40%. However, the muted curve reaction after the announcement is indicative that the market does not believe the bill in its current form will pass, perhaps due to the elimination of the state and local tax (SALT) deductions.

Net, net risks are to the upside in yields

Net, net we see the risks to the rates market being tilted bearish into the end of the year. Economic activity continues to be robust – the Citi hard data economic surprise index continuing to push on the upside, alongside global PMI growth. The Republican tax plan released yesterday is unlikely to pass in its current form, and the final shape will determine the impact of rates. Our view remains that there is modest upside to rates as the resulting increase in deficits translates into higher Treasury supply into next year.

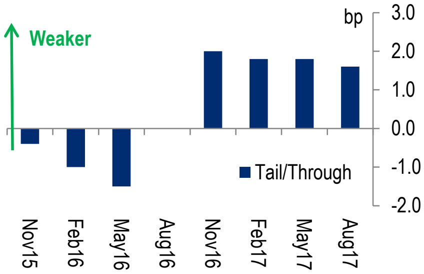
[1] https://waysandmeans.house.gov/chairman-brady-introduces-tax-cuts-jobs-act/

Treasury RV: 10y refunding on the ropes

The last four 10y refunding auctions had significant tails, likely driven by weak foreign demand. We fit a simple model which implies next week's 10y auction may disappoint.

Jason Williams

Figure 11. 10y refunding auctions have been disappointing this year



Source: Citi Research

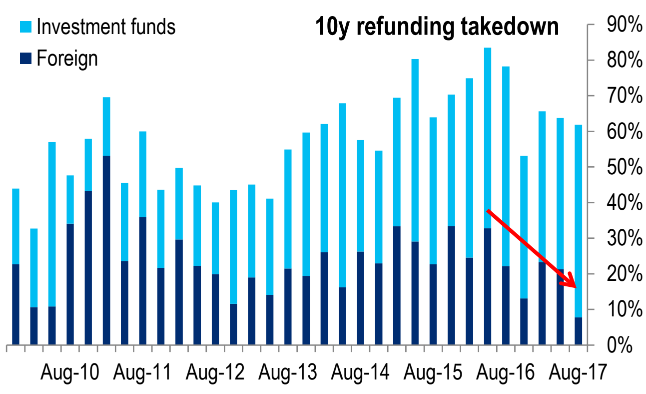
10y refunding auctions have disappointed this year

Since the US election last year the 10y refunding auctions have been weak, tailing by almost 2bp on average (Figure 12) see August's result in Alert: US Rates Analytics - 10yr Auction – Weak Demand). We posit that the weak 10y refunding auctions may be related to weak foreign demand as the previous refunding in August had the lowest foreign takedown (8%) in the post-crisis period for 10y refundings. In fact, foreign takedown for refunding auctions has recently been on a declining trend (Figure 13). It appears that the refunding auctions, which bring more supply than a reopening, may require foreign demand to be successful.

Weak foreign takedown is to blame

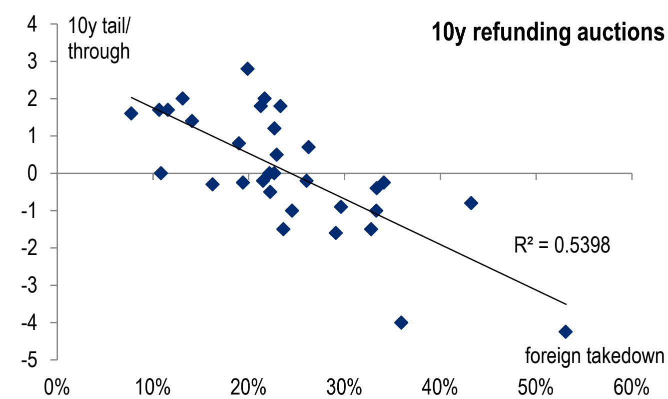
To prove this relationship we run a linear regression between foreign takedown, from the Treasury allotment dataset, and the strength of the 10y auction which we proxy by the through/tail of the auction (auction yield vs. when issued (WI) yield). When analyzing all 10y auctions, both reopening and refunding, there is a weak relationship in the post-crisis period (R^2 of only 24%). However, foreign demand does have a strong relationship to the tail/through metric when isolating refunding auctions (R^2 of 54%; Figure 13). Investment fund takedown, who over the past few years have become the largest participants in the 10y refunding, have virtually no relationship to the strength/weakness of the 10y refunding auction (R^2 of 1%). Hence the refunding auctions need foreign demand to absorb the additional supply. Interestingly, foreign demand appears to be an idiosyncratic factor for the 10y refunding since a similar analysis shows only a weak relationship between foreign demand and the strength of the 3y and 30y auctions (both next week).

Figure 12. Foreign takedown in 10y refunding auctions has been decreasing and poses a risk into next week



Source: Citi Research, Treasury

Figure 13. The 10y refunding auctions have been strong when foreign takedown is high



Source: Citi Research, Treasury; Note: Sample from 10/09 to 10/17

Building a predictive auction strength model

Given foreign participation in the 10y refunding auction is related to the auction's strength we next investigate predictive models, based on foreign demand/FX, to anticipate the strength of the next refunding auction. To do so we fit a logistic regression model which is calibrated to a simple question, will the upcoming 10y refunding auction go through the WI level by 0.25bp or more, which is indicative of a relatively strong auction. A logistic regression is a simple classification model that we can 'train' to then predict a binary outcome based on the independent variables. The method is a basic extension of a linear regression except the dependent variable is now binary and in our case represents whether the 10y auction goes through by 0.25bp or more. The output of a logistic regression is the model probability of the outcome of this event.

We train the model over the post-crisis period on three inputs. The first is the two month relative change in JPYUSD heading into the 10y refunding auction. This is a dollar strength variable and also roughly captures increasing or decreasing FX hedging costs. The second variable is the average foreign takedown of the previous two 10y reopening auctions. The final variable is the one month change, to the day prior to the auction, in the 5s10s30s fly which captures the sector's relative value. We tested multiple other factors which had little to no relationship, such as UST term premium, USD-JPY yield differentials, and longer or shorter changes in JPYUSD.

The in sample calibration results appear strong. The model correctly predicts 10 of 14 auctions which went through by 0.25bp or more and also correctly predicts 15 of 18 auctions which did not (Figure 14). The betas from the model also appear reasonable. A near term weakness in USD is related to a stronger 10y auction, likely indicating cheaper FX-hedging and perhaps an opportune buying opportunity for foreigners. The previous foreign takedown appears to be a momentum indicator with higher foreign demand in the previous two re-openings implying a stronger refunding auction. The change in the 5s10s30s fly appears negatively related to auction strength which could be indicative of near-term momentum.

Next week's 10y reopening is unlikely to be strong

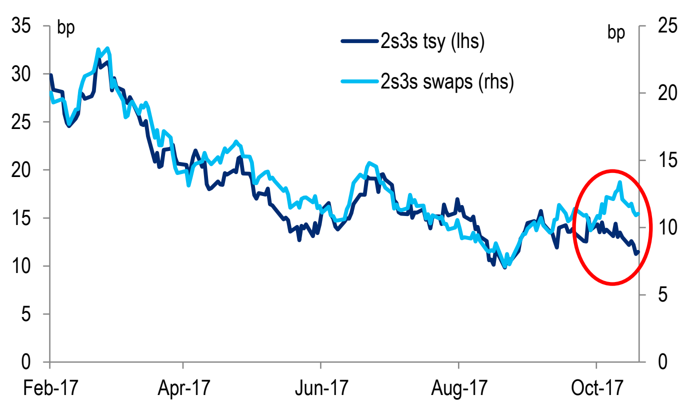
Next week's auction is unlikely to go through by 0.25bp or more based on the model. This is due to the recent strength of the USD and the extremely weak foreign takedown in the previous two reopening auctions (average of 12%).

Figure 14. Results of the logistic regression fit (True positive 71%, True negative 83%)

# occurrences	Auction went through by 0.25bp	Auction did not go through by 0.25bp	
Model predicts 10y goes through by 0.25bp	10	3	13
Model predicts 10y does not go through by 0.25bp	4	15	19
	14	18	
Accuracy	71%	83%	

Source: Citi Research

Figure 15. The 2s3s Treasury slope has remained depressed even while the 2s3s swap slope has steepened



Source: Citi Research, Bloomberg

Watch the 2s3s slope heading into the 3y auction

The 3y note auction next week could also be at risk due to the relative richness of 3s against the curve. The 2s3s Treasury slope has remained significantly depressed this month even while the 2s3s swap slope steepened (Figure 15). This could pose a valuation risk for the 3y sector of the curve which may depress the auction.

Swaps: TBAC and Powell shake spreads

Ruslan Bikbov

We continue to like front-end OIS/Tsy tighteners due to our expectations of increased supply in the front end, but see better value in 3s at this time. We think 30y spreads may be a touch wide to fair value and may be set for a near-term retracement. We like buying 10y spreads vs OIS/1.375 Oct 20 tighteners to express our view on a steeper spreads curve.

The spreads curve has steepened on supply expectations

Two weeks ago we recommended positioning for a steeper spreads curve via buying 30y spreads vs OIS/1.5 Oct 19 tighteners (With Jay Powell comes rate responsibility). (See link for risks.) Since then, the market has moved in line with our views as the spreads curve has steepened. The 30y spreads have widened by almost 5bp to -25bp, the widest level since 2015. This has been mainly driven by the change in the outlook for long-term Treasury supply. Treasury Secretary Mnuchin has downplayed the idea of ultra-long bonds earlier this week. The TBAC also recommend increasing issuance in the front end, as discuss below. In addition, the market has appeared to grow more skeptical on the likelihood of tax reform given controversial details released this week, such as SALT deduction repeal.

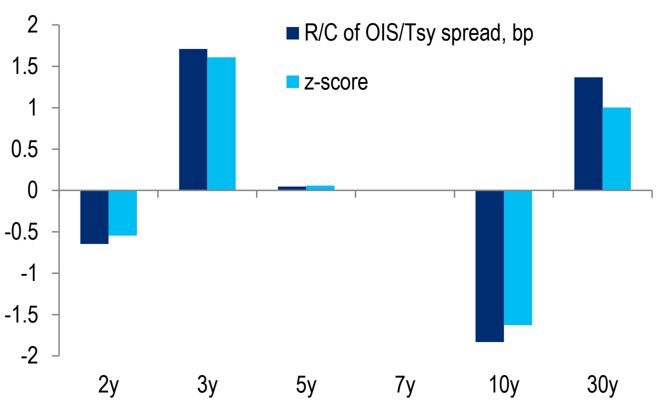
Further, the nomination of Jay Powell for Fed Chair may have supported deregulation expectations. Indeed, Powell has previously mentioned that the Fed may be looking to modify eSLR rule in a way that would bring it more in line with risk-based capital calculations. He also expressed a preference for greater CCAR transparency. These initiatives may eventually reduce balance sheet pressures, supporting spreads, especially in the back end.

While longer-term spreads have widened, front-end OIS/Tsy spreads have tightened. The OIS/1.5 Oct 19 has tightened by about 1.5bp since we wrote about it. This has been also caused by supply outlook given the recent TBAC recommendation to raise supply in the 2y-5y part of the curve. In fact, TBAC recommendation for February-April issuance includes monthly $2bn hikes in the sizes of 2y and 3y auctions (Get ready for higher Treasury supply in 2018).

Position for tighter 3y spreads

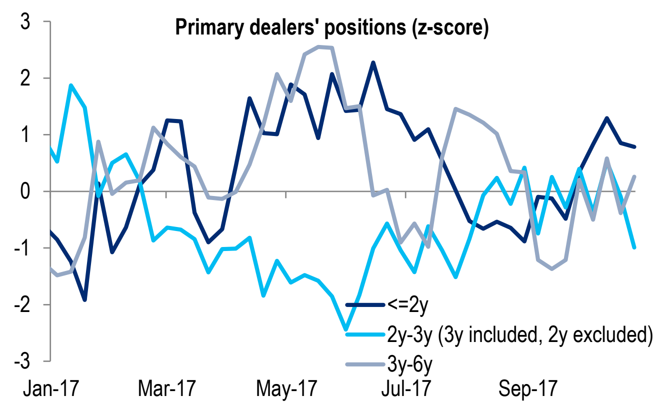
We continue to think that front-end spreads have more room to tighten but we now see greater value in the 3y sector. Indeed the 3y sector now looks wide on the PCA of the OIS/Tsy curve (Figure 16; the same is true for the swap spreads curve).

Figure 16. The 3y sector looks wide on the spreads curve...



Note: The figure shows rich/cheap in bp together with z-scores of OIS/Tsy spreads relative to first two principal components of the spreads curve. The 1/1/2016-11/2/2017 data sample is used. Source: Citi Research

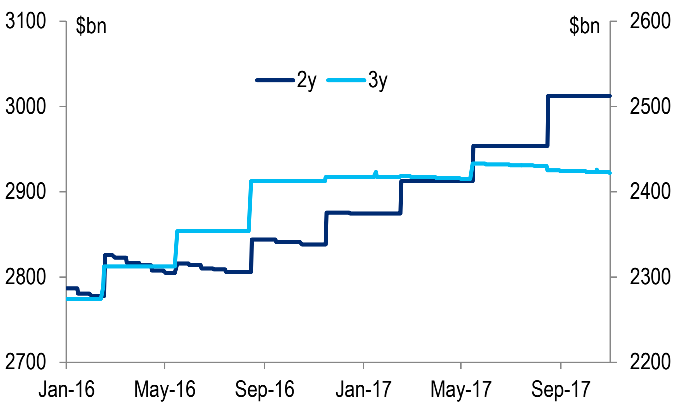
Figure 17. .. likely driven by demand for 3s



Source: Citi Research, NY Fed

Part of this dislocation has been likely driven by the recent demand for UST 3s, evident from the notable decline of dealers' inventories in the 2-3y (3y included, 2y excluded) sector of the curve (Figure 17). In contrast, inventories in the <=2y sector have increased, indicating selling pressure in that part of the curve (Figure 17). In addition, net supply in the 3y sector has been stable this year, while net supply in the 2y sector has been increasing (Figure 18).

Figure 18. Unlike 2s, net supply in 3s has been stable



Note: The figure shows outstanding coupons in 2y and 3y sectors. We use 1y-3y and 2y-4y buckets (excluding end points) to measure supply in 2y and 3y sectors. Source: Citi Research

Figure 19. TBAC recommended a steep pick-up in the supply of 3s

	FRN	Nominal Treasuries					
Month	**2y**	**2yr**	**3yr**	**5yr**	**7yr**	**10yr**	**30yr**
Nov-17	13	26	24	34	28	23	15
Dec-17	13	26	24	34	28	20	12
Jan-18	15	26	24	34	28	20	12
Feb-18	15	28	26	35	29	24	16
Mar-18	15	30*	28	35*	29*	21	13
Apr-18	17*	32*	30*	35*	29*	21*	13*

Note: Grey area is TBAC's recommendations. Starts (*) indicate our interpretations of TBAC's recommendations. Source: Citi Research, US Treasury.

However, changing supply dynamics should drive 3y spreads tighter, in our view. As discussed above, the TBAC recommended a much faster increase in 3s supply than previously expected, with a $2bn monthly hike starting in February (Figure 19). Positioning for tighter 3y spreads is complicated by the fact that on-the-run as well as old notes trade special in repo. For this reason, we like expressing our views using **OIS/1.375 Aug 20** matched-maturity tighteners. The 1.375 Aug 20 note trades only 5bp through GC. In Figure 20 we calculated z-scores of OIS/Tsy matched-maturity spreads as well as relative valuation of bonds to our Treasury spline. The OIS/Tsy matched-maturity tightener expressed in the 1.375 Aug 20 note looks relatively attractive by these metrics.

Figure 20. OIS/1.375 Aug 20 spreads tightener looks attractive on our valuation metrics

	OIS - Tsy Spreads			Spread to Fitted Curve				OIS - Tsy Spreads			Spread to Fitted Curve		
Note	**Level, bp**	**1m ZS**	**3m ZS**	**Level, bp**	**1m ZS**	**3m ZS**	**Note**	**Level, bp**	**1m ZS**	**3m ZS**	**Level, bp**	**1m ZS**	**3m ZS**
T 1.500 Jun20	-2.13	-2.37	-0.28	0.37	0.34	1.42	**T 1.375 Aug20**	**-2.39**	**-1.86**	**0.42**	**-0.37**	**2.25**	**0.19**
T 1.625 Jun20	-2.29	-1.83	0.06	0.36	0.08	0.94	T 1.375 Sep20 OFR	-1.20	-1.39	n/a	-1.94	0.04	n/a
T 1.875 Jun20	-2.21	-2.48	-0.45	0.35	1.43	2.14	T 2.000 Sep20	-3.04	-1.69	0.48	-0.46	1.00	-0.37
T 1.500 Jul20	-2.35	-2.09	0.15	0.36	-0.45	0.71	T 1.375 Sep20	-3.51	-1.96	0.33	0.00	1.95	0.63
T 1.625 Jul20	-2.70	-2.33	-0.03	0.40	1.90	2.62	T 1.625 Oct20 OTR	-1.90	n/a	n/a	-1.57	n/a	n/a
T 2.000 Jul20	-2.55	-2.19	0.02	0.22	1.31	1.86	T 1.750 Oct20	-3.93	-1.77	0.50	-0.58	1.94	0.03
T 1.500 Aug20	-2.10	-2.02	n/a	-0.79	-0.30	n/a	T 1.375 Oct20	-4.26	-1.79	0.51	-0.23	2.14	-0.02
T 2.125 Aug20	-2.83	-1.79	0.37	-0.20	0.97	-0.18	T 2.000 Nov20	-4.66	-1.10	0.77	-0.01	-0.64	-1.47

Note: Red (green) cells indicate best (worst) bonds evaluated by z-scores of the OIS/Tsy spreads and relative value to spline. Date: 11/2/2017. Source: Citi Research

The widening in 30y spreads may be overdone, tactically

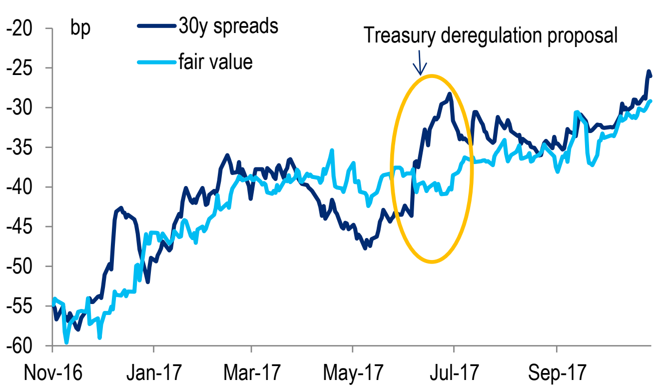
With 30y spreads at the widest levels since 2015, it is crucial to assess their valuations to fundamental drivers. We use a fair value framework introduced in A new regime for 30y spreads and based on 3m OIS/GC spreads (measuring balance sheet pressures and structural developments in the repo market), S&P (measuring the effect of VA hedging), financial fixed-rate supply, and the deficits/GDP ratio. We calculated the actual change in the 30y spreads from pre-election vs the change in fair value based on the moves in OIS/GC spread, stocks, corporate supply, and expected deficits/GDP ratio. To measure the latter factor we use our model for the perceived change in deficits/GDP ratio introduced in US Rates Weekly: Shake it off.

Following the recent widening, 30y spreads look about 3bp wide to fair value calculated this way (Figure 21). Granted, our framework does not explicitly account for deregulation. But as discussed in A new regime for 30y spreads, one way to think about the quantitative effect of deregulation on spreads is the impact on expectations of the OIS/GC spreads, which is generally a good proxy of balance sheet pressures. Term (3m) GC already trades close to OIS, and we would not expect a significant further relative GC richening if deregulation proposals are implemented (Figure 22). From that point of view, the recent widening in 30y spreads may be somewhat overdone. Note that 30y spreads are prone to overreaction on deregulation news. For example, spreads significantly outperformed the fair value when the Treasury announced its deregulation proposal in June, but subsequently retraced (Figure 21). We therefore think that near-term risks to 30y spreads may be skewed tighter.

Buy 10y swap spreads vs OIS/1.375 Aug 20 spreads

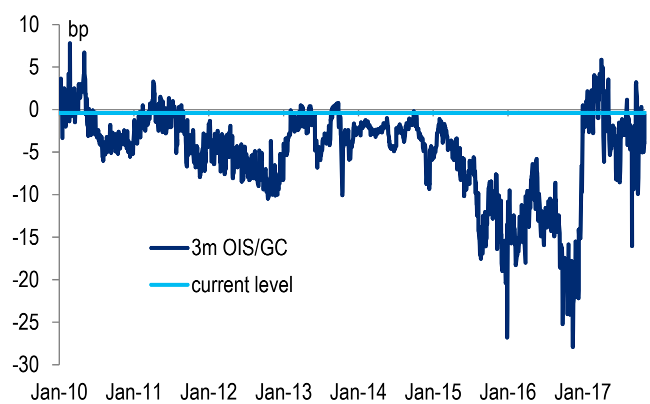
We believe our view on a steeper spreads curve is now better expressed as a 3s10s spreads steepener given the tightness of 10s and wideness of 3s on the curve (Figure 16). Specifically, investors may consider buying 10y swap spreads (-3bp as of 3pm on 11/3/2017) vs selling OIS/1.375 Aug 20 spreads (-2.4bp as of 3pm on 11/3/2017), matched-maturity and spread DV01-weighted. This trade carries negatively by only about -1bp over 3m. The main risk to this view is a material stock market selloff that may cause 10y spreads to tighten. However, 10y spreads are less sensitive to stocks than 30y.

Figure 21. 30y spreads looks wide to fair value following the recent widening



Source: Citi Research

Figure 22. Term GC already trades flat to OIS



Source: Citi Research

Short End: 2018 UST Supply Outlook

Steve Kang

UST supply is at the forefront in 2018. The cheapening of front-end UST basis is expected due to (1) offering size increases and (2) OIS/GC repo cheapening.

Net supply to increase by more than x2 in CY2018

It was a busy week for rates investors with the quarterly refunding (our initial reaction here: North America Rates Flash - Get ready for higher Treasury supply in 2018), the Fed meeting, Powell's official nomination, the ARRC roundtable and release of a house tax bill. We discuss the Fed and ARRC roundtable in the special section in our US rates weekly. The quarterly refunding passed by with no change in coupons as we expected, but plenty of talking points on issuance strategies going forward. We have been writing about a sharp jump in marketable debt supply to private investors next year. With a tax cut baked in, CY2018 net marketable borrowing needs from private investors are expected to be around $1.3tn vs $580bn tracking for CY2017.

The key takeaways from TBAC were: more front-end (2y/3y) issuance and more bills expected. Obviously larger bill issuance would tighten OIS/bill spreads and OIS/GC spreads. The front-end UST spreads are likely to tighten from tightening in OIS/GC and increase in offering sizes. As for the trade, we recommend 3Y OIS/UST tightener, paired with 10Y swap spreads widener. Please look at spreads section for more details.

Figure 23. Citi 2018 UST issuance forecast

	FRN	Nominal Treasuries						TIPS			Gross	Total Redemption			Fed	Net Supply
2018	2y	2yr	3yr	5yr	7yr	10yr	30yr	5y	10y	30y	Supply	Nominals	TIPS	FRNs	Maturity	to Pvt
Jan-18	15	26	24	34	28	20	12	0	13	0	172	115	19	41	30	27
Feb-18	15	28	26	35	29	24	16	0	0	7	180	163			49	65
Mar-18	15	30	28	35	29	21	13	0	11	0	182	121			31	92
Apr-18	17	32	30	35	29	21	13	16	0	0	193	123	52	45	35	8
May-18	15	32	30	35	29	24	16	0	11	0	192	158			55	89
Jun-18	15	32	30	35	29	21	13	0	0	5	180	119			30	92
Jul-18	17	32	30	35	29	21	13	0	13	0	190	117	17	43	30	44
Aug-18	15	32	30	35	29	24	16	14	0	0	195	154			44	85
Sep-18	15	32	30	35	29	21	13	0	11	0	186	116			17	87
Oct-18	17	32	30	35	29	21	13	0	0	5	182	117		42	23	46
Nov-18	15	32	30	35	29	24	16	0	11	0	192	176			62	78
Dec-18	15	32	30	35	29	21	13	14	0	0	189	118			17	88
Total	186	372	348	419	347	263	167	44	70	17	2,233	1597	88	171	424	801

Source: Citi Research

One time coupon hike expected, in Feb 2018

With a dramatic increase in funding needs from private investors for 2018, we expect the Treasury to deliver a coupon hike in February. Our expectations are in-line with TBAC's recommendation, $2bn quarterly increase in FRNs, $2bn monthly increase in 2y/3y and $1bn increase in 5y-30y (Figure 23) for Feb-May. We don't expect an increase in TIPS as the continual drop in long-end breakevens (5y5y currently at 180bp, lower than "symmetric" inflation target by the Fed and economists' inflation expectations) signals lessoned demand for TIPS. No further coupon hikes are necessary beyond this point, in our view.

Tax cut is the $300bn question remaining

We start with deficit forecasts. Deficit estimates for FY2018 varies widely across the street, with $550bn for lows (this is effectively a current law, i.e. no tax reform at all), $690bn for median and $875bn for highs from the primary dealer survey. Citi economist's expectations for FY2018 are at $810bn for now, higher end of the range. Figure 24(and Figure 25 for CY) shows funding and supply needs for each deficit scenario.

Bills as a residual supply, $500-$600 expected for 2018

As for bills as % of total debt, we think 2018 will exceed 25%-33% guidance that the TBAC gave. As we noted in our reaction piece, we believe 25%-33% is meant to be an average over several years. We expect front-loaded increase in bills as net bill issuance remained low due to the debt ceiling and we see capacity to be absorbed noted by rich OIS to bills/front-end spreads.

Upon the low estimate scenario (which is effectively a current law, no fiscal reform whatsoever), we think coupons sizes can remain the same. The residual amount funding needs of $432bn will come from bills. **On Citi's deficit scenario,** we think one coupon hike from Figure 23 should be enough for 2018. The coupon hike would increase the net supply by $132bn and lessen the need of bills to $560bn. **On the higher deficit scenario,** we penciled in two coupon hikes, Feb hike as noted above and May hike with $1bn across the coupon curve (including FRNs but no TIPS).

Figure 24. Bill issuance forecast for FY2018

Net Marketable Debt to Private Sector FY2018			
Deficit Scenarios	Low Est	Citi	High Est
Deficit	550	810	875
Fed Redemption	173	173	173
Replenishing Cash	200	200	200
Other	100	100	100
Total Funding from Pvt	1023	1283	1348
	No Coupon Hike		
Net Coup to Pvt	**591**	591	591
Net issuance of Bills	**432**	692	757
Bill as % of total new iss	**51%**	62%	64%
	One Coupon Hike		
Net Coup to Pvt	723	**723**	723
Net issuance of Bills	300	**560**	625
Bill as % of total new iss	35%	**50%**	53%
	Two Coupon Hikes		
Net Coup to Pvt	763	763	**763**
Net issuance of Bills	260	520	**585**
Bill as % of total new iss	31%	47%	**50%**

Source: Citi Research

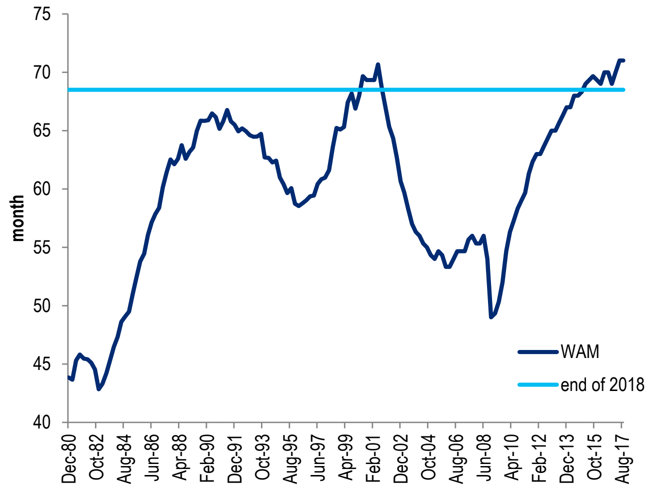
Figure 25. Bill issuance forecast for CY2018

Net Marketable Debt to Private Sector CY2018			
Deficit Scenarios	Low Est	Citi	High Est
Deficit	550	875	950
Fed Redemption	226	226	226
Replenishing Cash	150	150	150
Other	100	100	100
Total Funding from Pvt	1026	1351	1426
	No Coupon Hike		
Net Coup to Pvt	**615**	615	615
Net issuance of Bills	**411**	736	811
Bill as % of total new iss	**51%**	65%	68%
	One Coupon Hike		
Net Coup to Pvt	801	**801**	801
Net issuance of Bills	225	**550**	625
Bill as % of total new iss	28%	**49%**	52%
	Two Coupon Hikes		
Net Coup to Pvt	865	865	**865**
Net issuance of Bills	161	486	**561**
Bill as % of total new iss	20%	43%	**47%**

Source: Citi Research

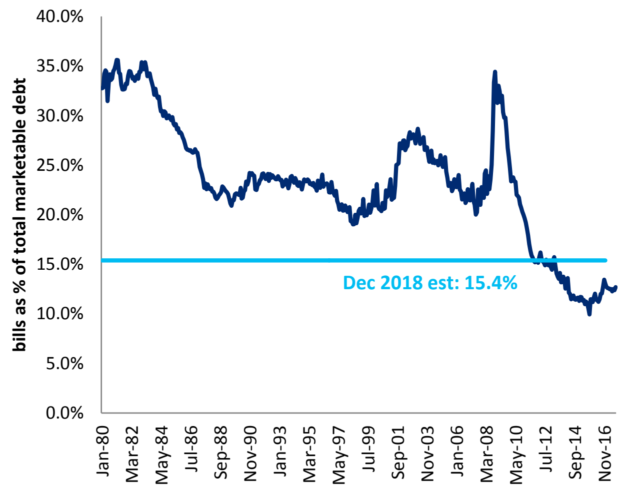
This scenario would ensure that WAM is not decreasing too much (which decreases slightly to 68.5 month from 70 month as of now, Figure 26), while bill as % of total outstanding is increasing.to 15.4% from 12.7% today (Figure 27). TBAC discussed decreasing merits of lengthening WAM.

Figure 26. WAM of Total Outstanding Marketable Debt



Source: Citi Research, US Treasury

Figure 27. Bill as % of total marketable debt

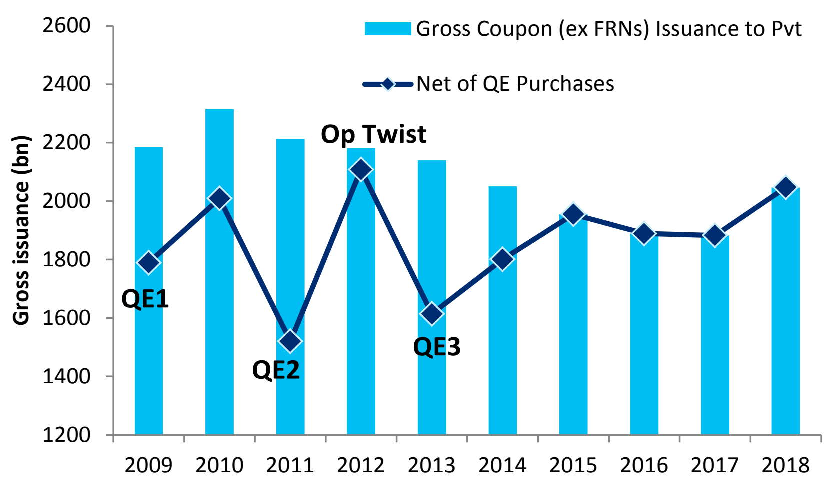


Source: Citi Research, US Treasury

For coupons, gross issuance tends to matter

Annual gross nominal/TIPS issuances to private investors are rising by $160bn to get to near the highest gross issuance since the crisis (Figure 28). The composition <5y coupons are likely to be greater as we expect more issuance are expected in those sectors. We are positioning for this with 3Y OIS/UST tightener with 10y swap spreads widener.

Figure 28. Gross issuance to private investors are expected to increase in 2018, likely to cause a tightening in spreads

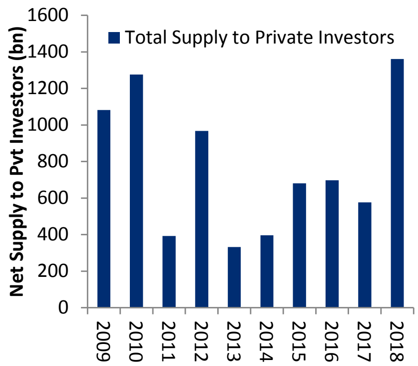


Source: Citi Research

Bill issuance is the story for 2018

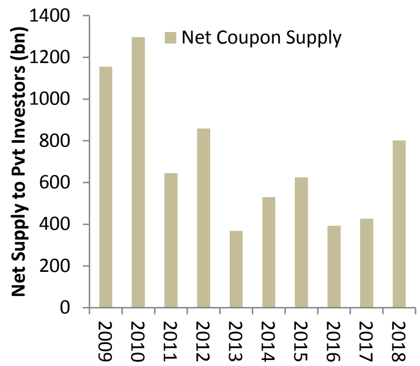
The real story is on bill issuance, which we expect to increase by $600bn by the end of next year. In terms of net issuance (Figure 29, Figure 30, Figure 31), 3M/1M bill, which is trading 15bp through FF OIS, is likely to cheapen to trade around -5bp against OIS. 3M OIS/GC is also likely to cheapen by 10bp by the end of next year with this much of supply. Figure 32 shows our monthly bill issuance expectations chart assuming cash balance guidance from the refunding. We expect sharp jump in Feb/April as (1) Feb tend to be large deficit month and (2) debt ceiling resolution in Q1 would bring up funding needs sharply (Figure 32).

Figure 29. Net issuance to private investors



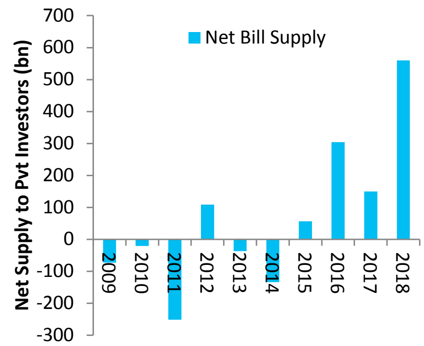
Source: Citi Research

Figure 30. Net coupon issuance to private



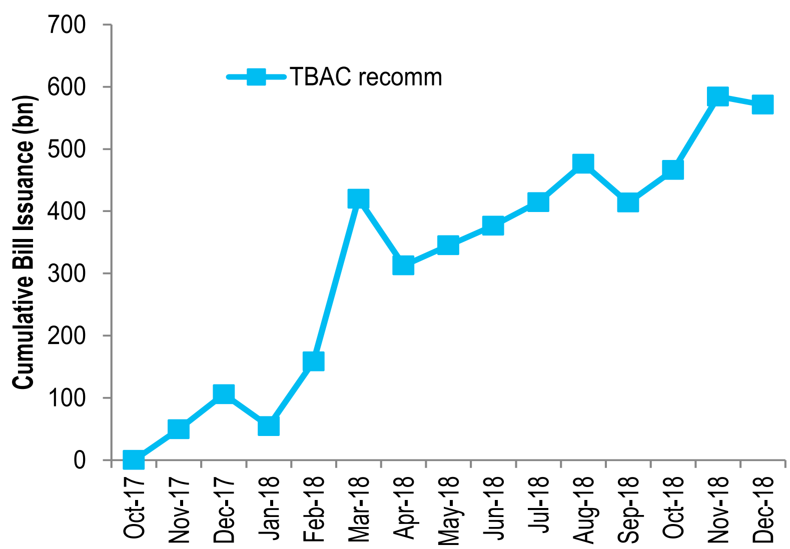
Source: Citi Research

Figure 31. Net bill issuance to private



Source: Citi Research

Figure 32. Bill issuance to increase sharply in Feb/April



Source: Citi Research

TIPS: Short term bullish

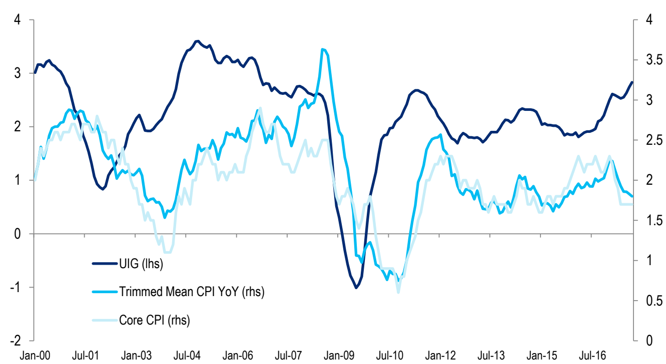
Jabaz Mathai
Steve Kang

We are long 5y breakevens based on our expectations of higher energy prices and increases in some core categories such as used vehicles resulting from the effects of the recent hurricane activity in the US (see North America Rates Trade Idea - Buy 5y TIPS breakevens). As we discussed in the last monthly, the depreciation in the trade weighted US dollar over the last year is also likely to push core CPI up through the goods channel over the next four to eight quarters (see Global Inflation Strategy Monthly - Breakevens on the rise). 5y BEs have risen about 12bp since we initiated the trade, and we expect another 10bp of widening over the medium term as we target 1.90% on 5y BEs.

Core CPI, which strips out volatile measures of food and energy, (1) may include still volatile components such as airfare and (2) may neglect subcomponents in headline which may be persistent indicators of inflation. In order to adjust this for the first factor, there are various measures such as trimmed mean, sticky price CPI, etc. Recently, the NY Fed released its own measure of inflation, the Underlying Inflation Gauge (UIG), which seeks to measure persistent inflation by taking account more than price information. We tested the relationship between the UIG and core CPI and found that historically at least; the UIG has been a reasonably good predictor of 1y forward core CPI (see Figure 33). At the moment, the UIG is signaling a pickup in inflation.

By design, the UIG is a "data-rich" model of inflation which, rather than excluding items like Core CPI and PCE, includes non-price information such as labor market, money, producer surveys, and financial variables[2]. According to the NY Fed, while core measures of inflation may reduce volatility by excluding components that display large price changes (in either direction), they may also remove any early signals of changes in the underlying inflation. Figure 34 shows the results of a correlation study we did over various time horizons for core CPI.

Figure 33. UIG behaves differently than other measures of inflation, such as trimmed mean (shown below) or sticky core.



Source: Citi Research, NY and Dallas Fed.

Figure 34. The UIG measure demonstrates a reasonably more correlated to future core CPI

Correlations vs 1y Lagged Core CPI	UIG	Headline CPI	Core CPI	Core PCE
Jan 2000- Present	0.735	0.430	0.269	0.333
Jan 2000- Nov 2006	0.577	0.620	0.206	0.278
Dec 2006- July 2009	0.803	0.445	0.576	0.687
Aug 2009 - Present	0.788	0.069	0.014	-0.107

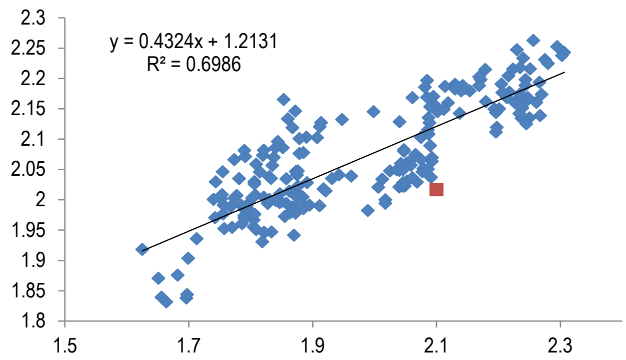
Source: Citi Research

Certainly, rising core inflation in the medium term would play out very well for our long position in 5y breakevens. Indeed, 2y forward 3y inflation looks cheap compared to short-end inflation expectations (Figure 35). Inflation in the belly of the curve (2y fwd 3y) looks cheap against front-end inflation expectations (2y)…. The 5y part of the inflation curve also looks cheap on various inflation swap butterflies (Figure 36). Bear in mind that the flatness of the breakeven curve means that butterfly structures in general show the belly as being attractive across the curve. It is certainly possible that the 10y part of the curve could perform well on an inflation

[2] Such as short and long term government interest rates, corporate and high yield bonds, consumer credit volumes and real estate loans, stocks, commodity prices

surprise, but given that the Fed is in play, the back end of the breakeven curve would continue to be under some pressure.

Figure 35. Inflation in the belly of the curve (2y fwd 3y) looks cheap against front-end inflation expectations (2y)…



Source: Citi Research, Bloomberg

Figure 36. …5yr inflation swaps also look cheap against other tenors

	1m Z Score	3m z-Score	6m Z-Score	1y Z-Score
2y, 5y, 7y	-1.21	-1.41	-1.86	-1.19
3y, 5y, 7y	-0.45	-1.28	-1.62	-0.89
2y, 5y, 10y	-0.85	-1.38	-1.79	-0.77
3y, 5y, 10y	-0.19	-0.58	-0.70	0.08

Source: Citi Research, Bloomberg

The price of the 5yr breakeven trade as of 5pm on 11/03/2017 is 1.805% and the 1mo breakeven carry is 6.22bps and the 3mo carry is -4.39bps. The risk to this position is further weak CPI/PCE prints.

LIBOR: ARRC broadens mandate

Ruslan Bikbov
Jason Williams
Steve Kang

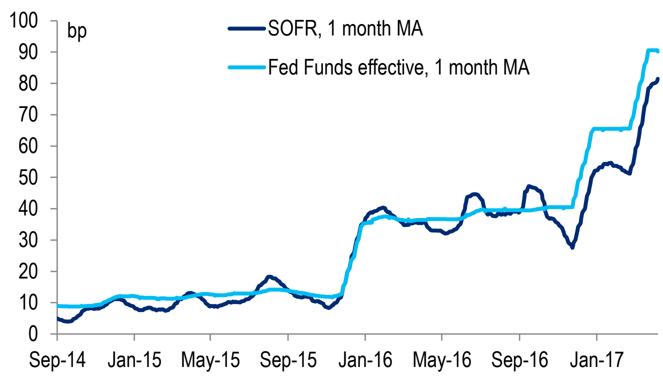
The ARRC has adopted an accelerated timeline for the development of the SOFR-based derivatives market. We believe the timeline is too optimistic and continue to think LIBOR will continue to be published well beyond 2021. The introduction of term SOFR rates only late in the process may be a problem for the broad adoption of SOFR derivatives.

ARRC roundtable

On November 2, 2017, The Alternative Reference Rates Committee (ARRC) hosted a public roundtable that covered the work of the ARRC to date, including its recent recommendation of the Secured Overnight Financing Rate (SOFR) as a robust alternative rate to USD LIBOR (see Short-End Notes: All Hail GC), as well as details of its transition plan away from LIBOR.

For some background, SOFR is a volume-weighted median Treasury GC overnight repo rate derived from three segments of the repo market 1) tri-party repo, 2) GCF repo, and 3) FICC-cleared bilateral repo transactions.[3] As shown in Figure 37, SOFR moves similarly to the Fed Funds rate, but can vary as it provides exposure to repo financing.

Figure 37. The Secured Overnight Financing Rate (SOFR) vs Fed Funds (1m average)



Source: Citi Research, NY Fed

The need for the financial community to move away from LIBOR became more urgent after Andrew Bailey, the CEO of the UK's Financial Conduct Authority (FCA), put LIBOR on notice over the summer (see US Rates Weekly: Repeal and replace LIBOR). Specifically, Bailey proposed to end the effective requirement on banks to participate in the LIBOR submission process beyond 2021. This has led the financial community to re-examine all financial contracts referencing LIBOR to understand possible fallback scenarios in the near term.

Key developments

Key developments from the ARRC roundtable can be summarized as follows:

- **Accelerated timeline.** ARRC's revised transition timeline now targets the end of the transition in 2021, previously indicated by FCA as a date where the FCA can no longer guarantee banks contributing to the LIBOR panel (Figure 38).

- **Term SOFR.** The ARRC has explicitly added a term SOFR reference rate as the final step in their transition plan. A term SOFR rate, which previously has only been briefly mentioned in the ARRC minutes, would likely help the adoption of SOFR by end-users (see US Rates Weekly: Let's Get Fiscal).

[3] The New York Fed plans to trim the data so SOFR is more reflective of GC since bilateral repo trades contain specials. To do so they will remove bilateral transactions with rates in the bottom 25th percentile.

- **Expansion of the ARRC's mandate to cash markets.** While the ARRC effort was previously constrained to interest rate derivatives, it has created working groups to facilitate transitioning of end-user cash products based on LIBOR, such as floating rate notes, CLOs, mortgage and consumer loans, as well as securitized loans (MBS, CMBS and ABS).

Figure 38. The ARRC has introduced an accelerated transition timeline

Date	ARRC Transition Plan
H2 2018	Infrastructure for futures and/or OIS trading in the new rate is put in place by ARRC members
YE 2018	Trading begins in futures and/or bilateral, uncleared, OIS that reference SOFR
Q1 2019	Trading begins in cleared OIS that reference SOFR in the current (EFFR) PAI and discounting enviornemnt
Q1 2020	CCPs begin allowing market participants a choice between clearing new or modified swap contracts (swap paying floating legs benchmarked to EFFR, LIBOR, and SOFR) into the current PAI/discounting enviornment or one that uses SOFR for PAI and discounting
Q2 2021	CCPs no longer accept new swap contracts for clearing with EFFR as PAI and discounting except for the purpose of closing out or reducing outstanding risk in legacy contracts that use EFFR as PAI and discount rate. Existing contracts using EFFR as PAI and the discount rate continue to exist in the same pool, but would roll off over time as they mature or are closed out.
YE 2021	Creation of a term reference rate based on SOFR-derivatives markets once liquidity has developed sufficiently to produce a robust rate

Source: ARRC

- **Details on SOFR emerge.** The Fed has announced important details on the timeline and production process of SOFR, as well as TGCR and BGCR, two other more narrowly defined GC rates. The Fed now plans to publish the final Federal Register Notice by the end of Q4 2017, announce production date in Q1 2018 and start publishing rates toward Q2 2018. The Fed plans to publish the rate daily around 8:30am EST using data for the prior day's trading activity.

- **ISDA's fallback rates.** ISDA has converged to the idea of using SOFR + spread model as a fallback rate for permanent LIBOR discontinuation (we first discussed this in US Rates Weekly: Policy Eclipse). While the exact methodology Is not known yet, ISDA has announced key criteria for the methodology: 1) minimizing value transfer at the time of the fallback 2) minimizing potential for manipulation and 3) avoiding distortions due to market stress at the time of the fallback. ISDA has also decided not wait for the introduction of term SOFR benchmarks for the development of the fallback mechanism. The fallback solution will therefore be based on the term structure of the overnight SOFR-based OIS curve.

Our takeaways

We continue to think LIBOR is unlikely to be phased out by 2021 even based on the ARRC's proposed aggressive timeline (Figure 38). We believe the ARRC timeline is too optimistic given that it will take significant time to build liquidity in even the simplest derivatives such as futures (see US Rates Weekly: Let's Get Fiscal). In fact, there was a discussion during the roundtable that the transition process is being slowed down by the fact that SOFR itself is still not published

Also, the potential hold-out of legacy LIBOR-based products could delay the transition. In fact the ARRC acknowledges that a significant amount of these products, such as MBS, are projected to remain outstanding beyond 2021 (Figure 39). Given that the fallback to LIBOR rates, however well calibrated, is likely to create some disruptions, it is in the regulators best interest to ensure the extension of LIBOR until the significant amount of transition is done.

Figure 39. % of roll-off after each year. This highlights challenging transition plan on potential hold-off on legacy contracts

USD LIBOR Market Footprint by Asset Class		% roll off after x years							
	Years:	1y	2y	3y	5y	7y	10y	20y	30y
Loans	Syndicated Loans	19%	36%	62%	90%	96%	97%	98%	99%
Bonds	Floating/ Variable Rate	29%	47%	62%	73%	74%	76%	80%	81%
Securitization	Residential MBS	0%	1%	2%	3%	5%	6%	18%	86%
	CMBS	1%	6%	8%	12%	23%	65%	80%	89%
	ABS	3%	6%	9%	15%	20%	25%	39%	88%
OTC Derivatives	IRS	18%	31%	42%	65%	75%	83%	96%	99%
	FRA	94%	99%	100%	100%	100%	100%	100%	100%
	Interest Rate Options	45%	59%	66%	74%	77%	79%	81%	81%
	Cross Currency Swaps	29%	46%	60%	76%	83%	88%	95%	99%
Exchange Traded Derivatives	Interest Rate Options	77%	94%	100%	100%	100%	100%	100%	100%
	Interest Rate Futures	33%	67%	88%	99%	100%	100%	100%	100%

Source: Citi Research, NY Fed. Note: The data as of 2014. We assume the roll-off schedule has not changed much since then.

Given that the ARRC is still so early in this process, we could see changes in the timeline, especially with the uncertainty around how liquid the early derivative will be. One way the ARRC may hope to generate liquidity in SOFR derivatives is the requirement for the market to discount swaps with SOFR by 2021. This would build up SOFR derivative trading as dealers would need to hedge their discounting risks.

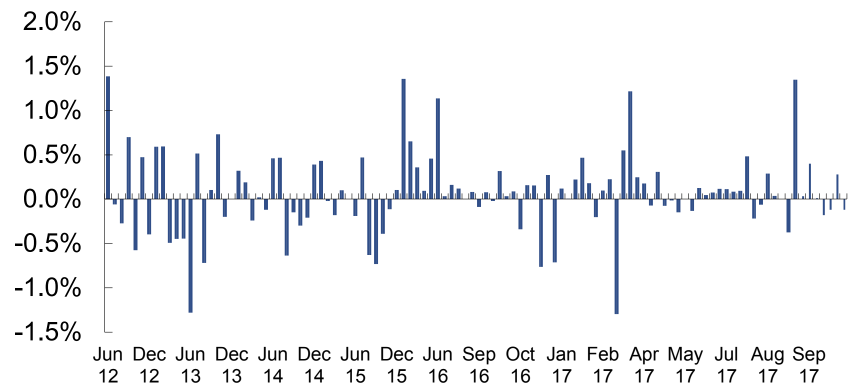
Even the most thought-out derivative infrastructure may not trade if there is a lack of end-user demand, who may want to hold out for a term version of SOFR. The updated ARRC timeline now shows a term SOFR reference rate won't be introduced before 2021, which creates a problem for end users such as floating rate notes as well as corporate hedgers who use swaps with quarterly resets. Transition out of quarterly resets could cause operational headache for end-users. However, the late placement of SOFR into the plan may not be that surprising given a term derivative market could cannibalize the o/n market, whose liquidity is needed to construct the term reference rate.

US Rates Strategy Model Portfolio Update

The US Rates Strategy Model Portfolio is up 4.32% so far year to date.

Figure 40 shows the monthly model portfolio returns since June 2012. Figure 41 shows the P&L from our outstanding trades, while Figure 42 shows all trades closed in 2017. To see the older trades, please refer to a previous publication.

Figure 40. Monthly Returns for the US Rate Strategy Model Portfolio, Jun 2012 – Oct 2017



Past performance is no indicator of future results. Calculations do not include transaction costs and other fees.
Source: Citi Research

Outstanding Trade Recommendations[4]

Buy 3y TIPS ASW: Opened December 17, 2015, horizon 12 months; see US Rates 2016 Outlook

Buy 1x2 curve floor spreads: Opened November 28, 2016, horizon 1 months; see North America Rates Trade Idea - Buy 1x2 curve floor spreads

Buy 10y10y straddles: Opened January 12, 2017, horizon 3 months; see North America Rates Trade Idea - Buy 10y10y straddles

Selling smile on the 3y5y strike fly Opened June 27, 2017, horizon 3 months; see North America Rates Trade Idea - Selling smile on the 3y5y strike fly

Buy 7y5y/2y5y5y swaption switch Opened July 18, 2017, horizon 3 months; see North America Rates Trade Idea - Buy 7y5y/2y5y5y swaption switch

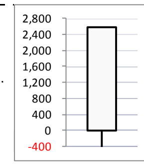
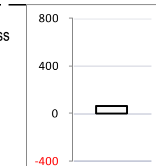
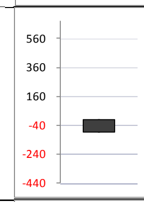
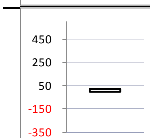
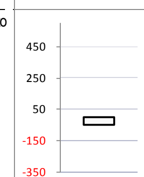
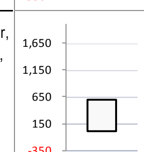
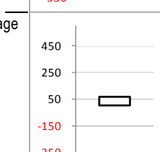
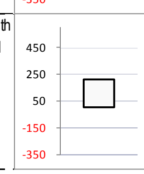
Buy 5y TIPS breakevens Opened September 8, 2017, horizon 3 months; see North America Rates Trade Idea - Buy 5y TIPS breakevens

Buy 1x2 3m3y receiver spreads Opened September 8, 2017, horizon 3 months; see North America Rates Trade Idea - Buy 1x2 3m3y receiver spreads

Enter 1y1y JPYUSD XCCY wideners Opened September 12, 2017, horizon 3 months; see North America Rates Trade Idea - Enter 1y1y JPYUSD XCCY Wideners

[4] For trades recommended here, the reasonable basis and risks can be found in the hyperlinked reports as well as the figure in the next page.

Figure 41. Summary of US Rates Strategy Model Portfolio Performance as of October 19, 2017

	Trade	Levels		Rationale + Publication Date		
Inflation	**Buy 3y TIPS ASW** Buy $ 300MM TII 0.125% 4/18 on ASW	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	28.5bp -2.6bp **2582 K** 1000K -700K	The tightening in swap spreads has resulted in TIPS cheapening vs. swaps. Without taking inflation risk, the April 18s can be asset swapped into a Libor floater yielding Libor + 28bp. Rolldown in a year is about 7p in favor of the trade. *Risks: Swap spreads continue to move into negative territory or a liquidity shock* US Rates Strategy Focus - 2016 Outlook (18 December 2015)		**Profit**
Curve	**Buy 1x2 curve floor spreads** Buy $1bn 1y 10s30s 15bp curve floors Sell $2bn 1y 10s30s 4bp floors	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	0.6 c 0 c **63 K** 800K -400K	The curve looks flat given perceived fiscal easing. Too much Fed hawkishness may already be priced in. 1x2 floor spreads offer attractive entry levels. *Risks: sharp further curve flattening shortly after initiation.* North America Rates Trade Idea - Buy 1x2 curve floor spreads		**Profit**
Volatility	**Buy 10y10y straddles** Buy $50mm of 10y10y straddles, delta-hedgd	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	72.7 bp 69.4 bp **-89 K** 680 K 440 K	We believe the case for a significant market selloff has weakened due to short market positioniing and the fact that a large part of expected fiscal easing already is priced in. Expectations of increased vega supply in long expieries is also priced in. *Risks: greater than expected callable supply.* North America Rates Trade Idea - Buy 10y10y straddles		**Loss**
Volatility	**Selling smile on the 3y5y strike fly** Buy $400mn 3y5y ATMF straddles Sell $566mn 3y5y ATMF +125bp payers Sell $548mn 3y5y ATMF -100bp receivers	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	77.2 bp 77.1 bp **25 K** 550 K 350 K	Implied smiles have richened recently reflecting concerns about fundamental uncertainty about the current macro and political environment coupled with the lack of realized vol and search for yield. *Risks: further richening of the implied smile.* North America Rates Trade Idea - Selling smile on the 3y5y strike fly		**Profit**
Volatility	**Buy 7y5y/2y5y5y swaption switch** Buy $150mn of 7y5y ATMF swaption straddle Sell $100mn ATMF-50bp/ATMF+50bp 2y5y5	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	77.6 bp 76.9 bp **-47 K** 850 K 500 K	We believe that volatilities are fundamentally cheap at these levels, in part due to a build-up of leverage in the system. This increase of leverage brings with it the potential to exacerbate any vol shocks, which could be prompted either by the ECB taper or uncertainty around the debt ceiling both coming in the next few *Risks: dvega/drate hedging flows in a market selloff and a pick-up in callable supply.* North America Rates Trade Idea - Buy 7y5y/2y5y5y swaption switch		**Loss**
Inflation	**Buy 5y TIPS breakevens** Buy 100mm of the April 22 TIPS Sell 104mm of the 1 7/8 of April 22s	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	1.678% 1.81% **590 K** 2220 K 980 K	An anticipation of a resurgence in reflation sentiment towards the end of the year, the potential for a weaker dollar to flow through into core goods prices next year, and some near term inflation effects from Hurricane Harvey. *Risks: sharp fall in risk sentiment precipitated by geopolitical worries* North America Rates Trade Idea - Buy 5y TIPS breakevens		**Profit**
Direction	**Buy 1x2 3m3y receiver spreads** Buy $300mn of 3m3y ATMF -5bp receivers Sell $600mn of 3m3y ATMF -15bp receivers	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	1.63% 1.94% **66 K** 180 K 140 K	We believe that the suspension of the debt ceiling until December sets the stage for a mild sell off in rates. This is further supported by the market's overly extreme dovish expectations for the Fed, with the next hike priced in for early 2019. *Risks: sharp fall in risk sentiment precipitated by geopolitical worries* North America Rates Trade Idea - Buy 1x2 3m3y receiver spreads		**Profit**
Cross-market	**Enter 1y1y JPYUSD XCCY Wideners** 1y1y JPYUSD XCCY receiver	Level at Open Level Current (5:00pm) **P&L** Target P&L Stop P&L	-58.5bp -62.75 bp **212 K** 675 K 425 K	The cash drain that we originally expected in Q4 2017 is delayed to Q2 2018 with the short term, debt ceiling suspension passed last week. The cash drain would also intensify in 2Q 2018 as the Fed B/S normalization would be well underway by then. The cross currency basis market is not currently sufficiently pricing in *Risks: upcoming September turn realizing lower than market pricing.* North America Rates Trade Idea - Enter 1y1y JPYUSD XCCY Wideners		**Profit**

*Units in thousand dollars, unless specified.

Source: Citi Research. (a) For a detailed list of all closed trades from May 2006 to May 2007, please see "US Rate Strategy — Trade Closeout," US Rate Strategy — Bond Market Roundup: Strategy, Citi, May 11, 2007. For a detailed list of all closed trades from May 2007 to May 2008, please see "US Rate Model Portfolio One-Year Anniversary Recap," US Rate Strategy — Bond Market Roundup: Strategy, Citi, May 30, 2008. Between May 2007 and May 2008, the group made a total of 87 trade recommendations, with 50 producing positive results, 36 negative, and one breaking even. This produced a 15.4% total return, with a 1.68 Sharpe ratio. Note: Return on risk is based on Citi's return-on-risk methodology and is calculated by taking the largest two-week change in the trade since January 1997. Return on portfolio based off $300 million model portfolio sizing. Note: Past performance does not indicate future results. Calculations do not include transaction fees and other costs.

Appendix I: Model Portfolio Closed Trades

Figure 42. US Rates Strategy Closed Trades in 2017

	Inception Date	Unwind Date	Initial	Unwind	P&L ($000s)	Target P&L	Stop Loss	Risk Return	Port Re
Sell 1m10y straddles, delta-hedged	Dec 13, 2016	Jan 12, 2017	85bp	80bp	$300	$ 300	$ 200	30.00%	0.
Sell 10y TIPS breakeven	Dec 2, 2016	Jan 30, 2017	1.985	2.11	($480)	$ 2	$ 2	-48.00%	-0
Buy 1y UST vs OIS	Dec 16, 2016	Jan 31, 2017	8bp	-4.3bp	$490	$ 600	$ 200	49.00%	0.
Selling 3y1y forward 6s3s basis swap	Aug 16, 2016	Mar 1, 2017	17.5bp	16bp	$150	$ 1,000	$ 600	15.00%	0.
Buy 2y JGBs on asset swap	Dec 16, 2016	Mar 8, 2017	57bp	34bp	$4,500	$ 4,000	$ 2,500	450.00%	1.
Tactically buy 30y TIPS breakevens	Feb 23, 2017	Mar 14, 2017	213.4bp	209bp	($578)	$ 890	$ 550	-57.80%	-0
Initiate OIS/1.625 Aug 19 spreads tightener	Mar 15, 2017	Mar 27, 2017	-2.6bp	4bp	($396)	$ 474	$ 306	-39.60%	-0
Buy the belly in 5s7s12s swap butterfly	Nov 30, 2016	Apr 7, 2017	-7.2bp	-9.3bp	$310	$ 1,360	$ 840	31.00%	0.
Enter FFK7/FFQ7 Fed Funds steepener	Feb 27, 2017	Apr 24, 2017	14bp	18bp	$165	$ 369	$ 205	16.50%	0.
Buy Volatility through 1m10y straddle	Mar 31, 2017	Apr 28, 2017	68	65	$205	$ 850	$ -	20.50%	0.
Initiate 30y swap spreads tighteners	Feb 28, 2017	May 1, 2017	-38.5bp	-44.875bp	$605	$ 605	$ 419	60.50%	0.
Buy 2y USTs into FOMC	May 3, 2017	May 4, 2017	1.281%	1.306%	($149)			-14.90%	-0
Sell Blues convexity adjustments, hedged	Feb 9, 2017	Jun 6, 2017	8.8bp	6.6bp	$552	$ 600	$ 350	55.20%	0.
Buy 5y5y USD vs. 5y5y CAD	Dec 16, 2016	Jul 6, 2017	34bp	21bp	$515	$ 700	$ 400	51.50%	0.
Buy EDM8 straddles vs OEM7 straddles	Mar 13, 2017	Jul 18, 2017	19 tick	2 tick	($425)	$ 1,250	$ -	-42.50%	-0
Pay 1y1y vs receive 1y10y JPYUSD basis	Apr 20, 2017	Jul 20, 2017	-6.7bp	-16.4bp	$483	$ 665	$ 385	48.30%	0.
10y TIPS short	Dec 16, 2016	Jul 25, 2017	68.5bp	50bp	$306	$ 5,000	$ 3,500	30.60%	0.
Sell Greens convexity adjustment, hedged	Jun 6, 2017	Aug 8, 2017	4.3bp	2.65bp	$476	$ 450	$ 225	47.55%	0.
Pay 2m3m vs receive 5m3m JPYUSD basis	Jul 31, 2017	Aug 28, 2017	-14.125bp	-30bp	$690	$ 800	$ 250	69.00%	0.
Positioning for lower rates through receivers	Jul 14, 2017	Sep 5, 2017	2.282%	2.026%	$725	$ 900	$ 440	72.50%	0.
Enter CAD flattener in the front end	Jul 26, 2017	Sep 7, 2017	22bp	12.5bp	$190	$ 240	$ 160	19.00%	0.
Switch to short duration: Sell eurodollars	Sep 7, 2017	Sep 20, 2017	1.61%	1.88%	$1,690	$ 1,500	$ 1,000	169.00%	0.
5s30s steepeners	Jan 30, 2017	Sep 20, 2017	112.9	103.9	($245)	$ 2,300	$ 1,300	-24.50%	-0
FV swap spread tighteners	Aug 14, 2017	Oct 13, 2017	9.40	8.20	$123	$ 984,000	$ 738,000	12.30%	0.
Buy 3m30y EUR payers vs USD payers	Jul 10, 2017	Oct 10, 2017	0.96	0.95	$48	900,000	650,000	4.80%	0.
Buy 2y30y vs 2y10y swaption straddles	Feb 1, 2017	Oct 25, 2017	7.5	5.1	($254)	400,000	250,000	-25.40%	-0

Source: Citi Research.

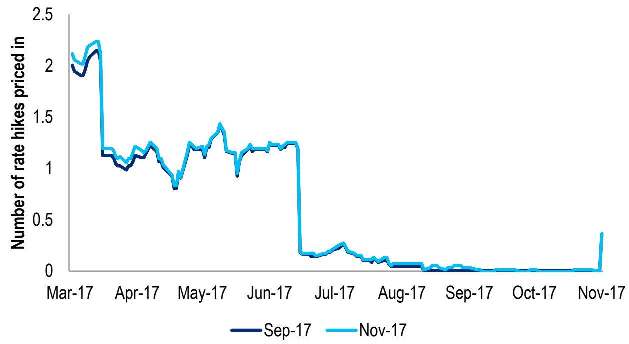
Appendix II: Market Rate Hike Expectations

Figure 43. Unconditional probability of a 25bp hike at each month and number of hikes priced extracted from Fed Funds Futures

Meeting Date	Nov-17	Dec-17	Jan-18	Mar-18	May-18	Jun-18	Jul-18	Sep-18
Probability of a hike	0%	87%	89%	137%	139%	176%	179%	179%

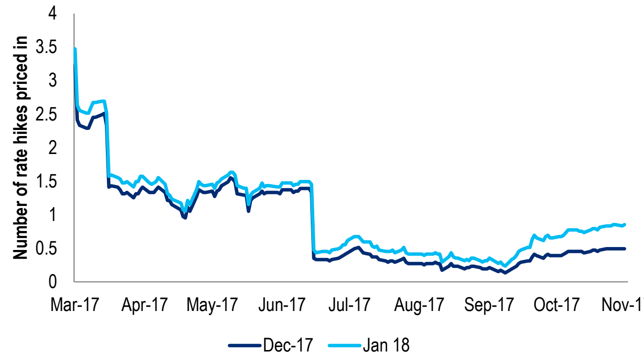
Source: Citi Research. Note: probability is calculated assuming 25bps per hike. Negative indicates a cut.

Figure 44. Number of rate hikes priced following Sep and Nov meeting



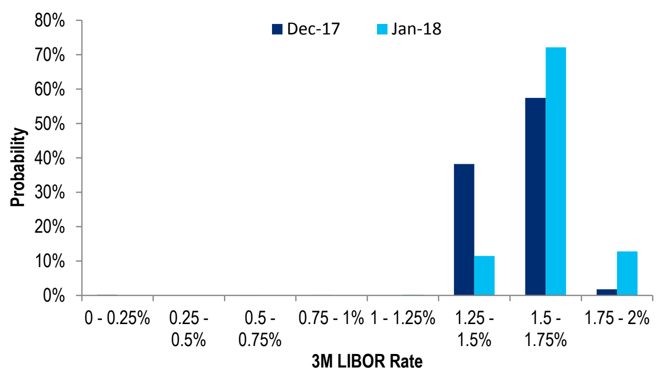
Source: Citi Research, Bloomberg; Note: cumulative sum dropped down due Dec 16, Mar 17 and Jun 17 hikes

Figure 45. Number of rate hikes priced following Dec and Jan meetings



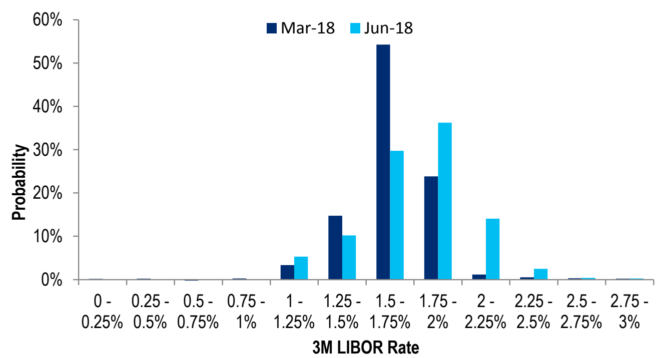
Source: Citi Research, Bloomberg; Note: cumulative sum dropped down due Dec 16, Mar 17 and Jun 17 hikes

Figure 46.Sep-17 and Oct-17 3m LIBOR probability distribution



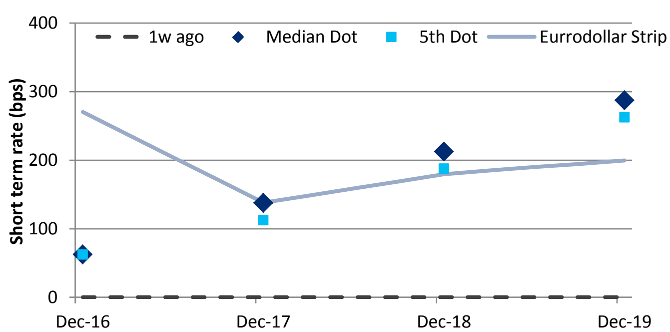
Source: Citi Research, Bloomberg

Figure 47. Dec-17 and Jan-18 3m LIBOR probability distribution



Source: Citi Research, Bloomberg

Figure 48. Market rate expectations vs Fed "dots"



Source: Citi Research

Figure 49. Market implied terminal rate

Source: Citi Research, Yieldbook

The methodology behind these figures is described in [US Rates Weekly- 30 Jan 2015]

Appendix III: Treasury Relative Value

Figure 50. Richest and cheapest treasury notes & bonds by sector

Sector		Bond	Spread to Curve (bp)	3m Median Spread (bp)	3m Percentile
1y-2y	Cheap	1.25% Nov18	1.42	0.18	94%
		1.375% Nov18	2.23	1.04	100%
		1.5% Dec18	0.95	0.03	98%
		1.625% Apr19	-0.50	0.38	2%
		1.25% Apr19	-0.31	0.62	0%
	Rich	1.375% Feb19	-0.89	0.46	0%
2y-3y	Cheap	3.375% Nov19	0.80	-0.67	100%
		1.875% Jun20	0.42	-0.87	100%
		1.375% Apr20	0.99	-0.16	94%
		2.125% Aug20	-0.14	-0.05	34%
		1.375% Aug20	-0.62	-0.45	36%
	Rich	1.25% Feb20	-0.37	-0.20	39%
3y-5y	Cheap	1.875% Aug22	-0.05	-0.40	83%
		2.125% Jan21	0.40	0.15	81%
		2% Jul22	-0.15	-0.38	78%
		2.125% Dec21	-0.09	0.62	2%
		2.625% Nov20	0.03	1.05	3%
	Rich	1.875% Nov21	-1.58	-0.32	0%
5y-7y	Cheap	2% Feb23	0.14	-0.09	78%
		2.75% Nov23	-0.94	-1.00	67%
		2.375% Aug24	0.11	0.11	50%
		1.75% May23	0.16	0.40	14%
		2.5% Aug23	-1.22	-0.83	8%
	Rich	1.625% Nov22	-1.25	-0.63	0%
7y-10y	Cheap	2.25% Nov24	-0.09	0.12	8%
		2% Feb25	-0.18	0.15	2%
		2.125% May25	-0.01	0.44	0%
		2% Feb25	-0.18	0.15	2%
		2.125% May25	-0.01	0.44	0%
	Rich	2% Aug25	-0.04	0.51	0%
10y-20y	Cheap	4.5% Feb36	-0.52	-0.43	0%
		4.75% Feb37	0.08	0.19	6%
		5% May37	0.81	1.19	0%
		5.25% Nov28	-0.43	1.26	2%
		5.25% Feb29	-0.03	1.75	2%
	Rich	6.125% Aug29	0.73	2.76	27%
20y+	Cheap	3.125% Feb42	-0.25	-0.30	66%
		3.125% Aug44	-0.46	-0.45	41%
		3.125% Nov41	-0.09	-0.04	36%
		4.5% Aug39	1.94	2.56	0%
		4.5% May38	0.94	1.59	0%
	Rich	4.25% May39	1.65	2.46	0%

Sector		Bond	Asset Swap Spread (bp)	3m Median ASW (bp)	3m Percentile
1y-2y	Cheap	2.75% Feb19	-17.2	-21.8	98%
		1% Jun19	-18.8	-23.3	98%
		1.625% Aug19	-18.8	-23.3	98%
		1.625% Apr19	-18.9	-22.1	97%
		1.5% Feb19	-17.7	-20.5	95%
	Rich	1.375% Feb19	-18.6	-21.0	90%
2y-3y	Cheap	3.375% Nov19	-19.7	-24.2	98%
		1% Nov19	-20.0	-23.6	98%
		1.25% Jan20	-19.2	-22.8	100%
		1.75% Oct20	-17.9	-18.5	52%
		2.125% Aug20	-18.6	-19.1	57%
	Rich	2% Sep20	-18.9	-19.4	54%
3y-5y	Cheap	2.375% Dec20	-17.1	-17.1	51%
		2.125% Jan21	-15.7	-15.7	49%
		2% Nov20	-17.6	-17.4	48%
		2.125% Dec21	-10.8	-9.1	0%
		2% Feb22	-11.6	-9.9	0%
	Rich	1.875% Nov21	-12.7	-10.6	0%
5y-7y	Cheap	2% Feb23	-4.1	-3.2	19%
		1.75% May23	-2.8	-1.8	6%
		2.75% Nov23	-2.2	-0.7	2%
		2.5% Aug23	-3.4	-1.7	0%
		2.5% May24	0.6	2.4	2%
	Rich	2.75% Feb24	-0.3	1.5	2%
7y-10y	Cheap	2% Feb25	2.0	3.6	2%
		2.25% Nov24	1.5	3.2	2%
		2% Aug25	2.8	4.8	0%
		2.25% Nov24	1.5	3.2	2%
		2% Aug25	2.8	4.8	0%
	Rich	2.125% May25	2.5	4.5	0%
10y-20y	Cheap	6.125% Nov27	0.5	9.1	0%
		5.5% Aug28	1.3	10.0	0%
		5.25% Nov28	0.5	9.8	0%
		6.25% May30	0.6	12.1	0%
		4.75% Feb37	6.9	19.7	0%
	Rich	5% May37	8.6	22.5	0%
20y+	Cheap	2.5% Feb45	24.0	29.4	2%
		2.75% Nov42	22.3	29.2	0%
		2.75% Aug42	21.8	28.8	0%
		4.5% Aug39	17.8	31.4	0%
		4.625% Feb40	19.4	33.5	0%
	Rich	4.75% Feb41	21.8	36.6	0%

Source: Citi Research
Notes: Left column contains coupon adjusted spreads to Citi's fitted bond curve. Right column contains asset swap spreads vs. Citi's swap curve.

Appendix IV: Swap Fly Relative Value

Figure 51. Equal weighted fly relative value table

11/2/2017			1:2:1 Swap					8/2/2017				
Fly Structure	Fly Structure	Weights	Level (bp)	3m C+R (bp)	Z Score			3m High (bp)	3m Low (bp)	3m Correlation		
					1m ZS	3m ZS	6m ZS			10s	2s10s	5s30s
2y, 3y, 5y	2- 3- 5	-0.5:1:-0.5	-1.6	0.0	0.39	1.30	1.93	-0.8	-4.0	10%	-41%	**-71%**
2y, 5y, 7y	2- 5- 7	-0.5:1:-0.5	6.7	-0.9	-0.48	0.58	-0.34	8.5	3.1	**90%**	**83%**	-26%
3y, 5y, 7y	3- 5- 7	-0.5:1:-0.5	1.2	-0.3	-0.37	0.50	-0.47	1.9	-0.4	**76%**	**76%**	-24%
2y, 5y, 10y	2- 5- 10	-0.5:1:-0.5	-0.2	-0.7	-0.07	1.07	0.40	1.1	-5.3	**82%**	**59%**	**-56%**
3y, 5y, 10y	3- 5- 10	-0.5:1:-0.5	-5.7	-0.2	0.46	1.32	1.03	-5.1	-8.8	**51%**	19%	**-81%**
2y, 7y, 10y	2- 7- 10	-0.5:1:-0.5	11.6	-1.0	-0.57	-0.22	-0.82	14.3	8.7	**91%**	**92%**	-9%
3y, 7y, 10y	3- 7- 10	-0.5:1:-0.5	6.1	-0.5	-0.54	-0.83	-1.15	8.6	5.2	**85%**	**96%**	3%
5y, 7y, 10y	5- 7- 10	-0.5:1:-0.5	-1.0	0.0	0.00	0.26	-0.29	-0.8	-1.5	**88%**	**75%**	-39%
5y, 7y, 12y	5- 7- 12	-0.5:1:-0.5	-4.4	0.1	0.55	1.15	1.24	-4.3	-5.8	**73%**	43%	**-73%**
2y, 10y, 15y	2- 10- 15	-0.5:1:-0.5	18.4	-1.2	-0.71	-0.79	-1.14	22.7	16.8	**88%**	**97%**	7%
3y, 10y, 15y	3- 10- 15	-0.5:1:-0.5	12.9	-0.7	-0.71	-1.21	-1.47	17.3	11.6	**78%**	**98%**	22%
3y, 10y, 20y	3- 10- 20	-0.5:1:-0.5	9.5	-0.6	-0.67	-0.95	-1.29	13.5	8.3	**84%**	**96%**	5%
5y, 10y, 20y	5- 10- 20	-0.5:1:-0.5	2.4	0.0	-0.67	-0.82	-1.23	4.3	1.8	**84%**	**90%**	-8%
5y, 10y, 30y	5- 10- 30	-0.5:1:-0.5	0.8	0.1	-0.57	-0.17	-0.74	2.3	-0.9	**86%**	**81%**	-27%
7y, 10y, 15y	7- 10- 15	-0.5:1:-0.5	-0.1	0.0	-0.92	-0.04	-0.44	0.4	-0.6	**76%**	**74%**	-24%
7y, 10y, 20y	7- 10- 20	-0.5:1:-0.5	-3.5	0.1	-0.37	0.74	0.55	-3.0	-5.0	**77%**	**59%**	**-56%**
7y, 10y, 30y	7- 10- 30	-0.5:1:-0.5	-5.1	0.2	-0.13	0.93	0.71	-4.5	-7.8	**76%**	**52%**	**-63%**
10y, 12y, 15y	10- 12- 15	-0.5:1:-0.5	0.0	0.0	-0.67	-0.81	-1.18	0.1	-0.1	**74%**	**74%**	-8%
5y, 15y, 20y	5- 15- 20	-0.5:1:-0.5	16.3	-0.4	-0.69	-1.39	-1.96	21.5	14.9	35%	**78%**	**81%**
5y, 15y, 30y	5- 15- 30	-0.5:1:-0.5	14.6	-0.3	-0.68	-1.36	-1.87	19.3	13.4	**58%**	**92%**	**59%**
7y, 15y, 20y	7- 15- 20	-0.5:1:-0.5	10.4	-0.3	-0.70	-1.36	-1.97	13.6	9.6	8%	**56%**	**94%**
7y, 15y, 30y	7- 15- 30	-0.5:1:-0.5	8.7	-0.2	-0.70	-1.33	-1.88	11.4	8.1	**52%**	**88%**	**64%**
10y, 15y, 20y	10- 15- 20	-0.5:1:-0.5	3.5	-0.1	-0.50	-1.22	-1.81	4.8	3.1	8%	**53%**	**88%**
10y, 15y, 30y	10- 15- 30	-0.5:1:-0.5	1.9	0.0	-0.32	-0.62	-1.18	2.6	1.6	**88%**	**87%**	-14%
5y, 20y, 30y	5- 20- 30	-0.5:1:-0.5	21.5	-0.5	-0.71	-1.44	-2.01	27.0	20.1	13%	**58%**	**93%**
7y, 20y, 30y	7- 20- 30	-0.5:1:-0.5	15.6	-0.4	-0.73	-1.41	-2.02	19.2	14.8	-18%	26%	**99%**
10y, 20y, 30y	10- 20- 30	-0.5:1:-0.5	8.7	-0.2	-0.59	-1.33	-1.94	10.6	8.3	-38%	0%	**94%**
12y, 20y, 30y	12- 20- 30	-0.5:1:-0.5	5.2	-0.1	-0.54	-1.31	-1.90	6.2	5.1	-44%	-11%	**88%**
15y, 20y, 30y	15- 20- 30	-0.5:1:-0.5	1.8	0.0	-0.28	0.38	-0.39	1.9	1.5	8%	2%	23%

Source: Citi Research
Notes: Level, carry, Z-scores and correlations are for positions receiving the belly. Positive number indicate cheapness in the belly, negative numbers indicate richness. Levels are for a -0.5:1:-0.5 weighted fly. Correlations are calculated over the most recent 3m window

Figure 52. PCA weighted fly relative value table

11/2/2017			PCA Swap					8/2/2017				
Fly Structure	Fly Structure	Weights	Level (bp)	3m C+R (bp)	Z Score			3m High (bp)	3m Low (bp)	3m Correlation		
					1m ZS	3m ZS	6m ZS			10s	2s10s	5s30s
2y, 3y, 5y	2- 3- 5	-0.69:1:-0.41	-16.5	-0.6	-1.05	-1.69	-1.40	-15.4	-16.6	-6%	-34%	**-69%**
2y, 5y, 7y	2- 5- 7	-0.39:1:-0.77	-32.0	-0.9	-0.87	-1.49	-1.69	-28.8	-32.3	-44%	**-62%**	-47%
3y, 5y, 7y	3- 5- 7	-0.47:1:-0.62	-20.5	-0.5	-0.72	-1.39	-1.80	-18.0	-20.9	**-54%**	**-63%**	-28%
2y, 5y, 10y	2- 5- 10	-0.65:1:-0.65	-61.3	-1.5	-0.99	-1.56	-1.76	-55.5	-61.9	-37%	**-53%**	-47%
3y, 5y, 10y	3- 5- 10	-0.70:1:-0.48	-38.9	-0.7	-0.77	-1.44	-1.87	-34.5	-39.5	-48%	**-56%**	-30%
2y, 7y, 10y	2- 7- 10	-0.32:1:-0.86	-39.3	-0.8	-0.92	-1.56	-1.79	-35.9	-39.7	-28%	-41%	-47%
3y, 7y, 10y	3- 7- 10	-0.36:1:-0.78	-30.6	-0.4	-0.70	-1.46	-1.93	-27.4	-31.0	-38%	-44%	-33%
5y, 7y, 10y	5- 7- 10	-0.52:1:-0.53	-11.4	-0.1	-0.53	-1.46	-2.01	-10.2	-11.6	-18%	-18%	-33%
5y, 7y, 12y	5- 7- 12	-0.63:1:-0.44	-16.2	-0.1	-0.84	-1.56	-2.10	-14.7	-16.4	-9%	-8%	-31%
2y, 10y, 15y	2- 10- 15	-0.26:1:-0.91	-40.4	-0.6	-1.81	-1.90	-1.86	-37.8	-40.4	1%	-3%	-35%
3y, 10y, 15y	3- 10- 15	-0.28:1:-0.86	-34.7	-0.3	-1.50	-1.72	-2.06	-31.9	-34.9	-8%	-7%	-25%
3y, 10y, 20y	3- 10- 20	-0.38:1:-0.83	-50.9	-0.4	-1.71	-1.70	-2.02	-46.9	-51.1	-1%	1%	-24%
5y, 10y, 20y	5- 10- 20	-0.44:1:-0.66	-26.0	0.0	-1.86	-1.77	-2.10	-23.9	-26.0	19%	27%	-16%
5y, 10y, 30y	5- 10- 30	-0.52:1:-0.62	-33.1	0.0	-1.85	-1.78	-1.96	-30.5	-33.1	21%	26%	-17%
7y, 10y, 15y	7- 10- 15	-0.50:1:-0.53	-7.8	0.0	-2.09	-2.25	-2.08	-7.2	-7.8	20%	29%	-11%
7y, 10y, 20y	7- 10- 20	-0.59:1:-0.45	-11.6	0.0	-2.01	-1.85	-1.98	-10.6	-11.6	27%	37%	-11%
7y, 10y, 30y	7- 10- 30	-0.66:1:-0.40	-14.6	0.0	-1.92	-1.87	-1.80	-13.5	-14.6	28%	34%	-13%
10y, 12y, 15y	10- 12- 15	-0.50:1:-0.50	-1.4	0.0	-1.10	-1.57	-1.89	-1.2	-1.4	23%	42%	5%
5y, 15y, 20y	5- 15- 20	-0.13:1:-0.91	-11.3	0.0	-1.06	-1.35	-1.74	-10.2	-11.4	33%	42%	-13%
5y, 15y, 30y	5- 15- 30	-0.24:1:-0.85	-21.1	0.0	-1.44	-1.58	-1.69	-19.3	-21.1	29%	32%	-16%
7y, 15y, 20y	7- 15- 20	-0.17:1:-0.85	-7.1	0.0	-0.75	-1.06	-1.51	-6.3	-7.2	41%	**50%**	-9%
7y, 15y, 30y	7- 15- 30	-0.30:1:-0.76	-12.8	0.1	-1.10	-1.40	-1.50	-11.7	-12.9	34%	37%	-14%
10y, 15y, 20y	10- 15- 20	-0.30:1:-0.72	-3.8	0.0	-0.25	-0.73	-1.25	-3.2	-3.9	48%	**57%**	-7%
10y, 15y, 30y	10- 15- 30	-0.46:1:-0.57	-6.3	0.1	-0.50	-1.09	-1.33	-5.7	-6.4	36%	37%	-14%
5y, 20y, 30y	5- 20- 30	-0.12:1:-0.94	-10.8	0.0	-1.41	-1.73	-1.54	-9.9	-10.8	24%	23%	-19%
7y, 20y, 30y	7- 20- 30	-0.15:1:-0.89	-6.7	0.1	-1.12	-1.68	-1.34	-6.2	-6.7	27%	25%	-18%
10y, 20y, 30y	10- 20- 30	-0.22:1:-0.80	-3.5	0.0	-0.60	-1.38	-1.17	-3.2	-3.6	25%	19%	-19%
12y, 20y, 30y	12- 20- 30	-0.30:1:-0.71	-2.2	0.0	-0.39	-0.97	-1.03	-2.0	-2.2	21%	9%	-23%
15y, 20y, 30y	15- 20- 30	-0.49:1:-0.52	-0.5	0.0	-0.21	-0.25	-0.74	-0.3	-0.7	5%	-11%	-25%

Source: Citi Research
Notes: Notes: Level, carry, Z-scores and correlations are for positions receiving the belly. Positive number indicate cheapness in the belly, negative numbers indicate richness. PCA weights are computed over a 5-year rolling window. PCA weighting is based on the weights of the 3rd principal component of the three legs of the fly over the analysis window. This reduces exposure to parallel (1st PC) and curve (2nd PC) moves among the three legs, but does not eliminate exposure or correlation to all parts of the yield curve at all times. Correlations are calculated over the most recent 3m window.

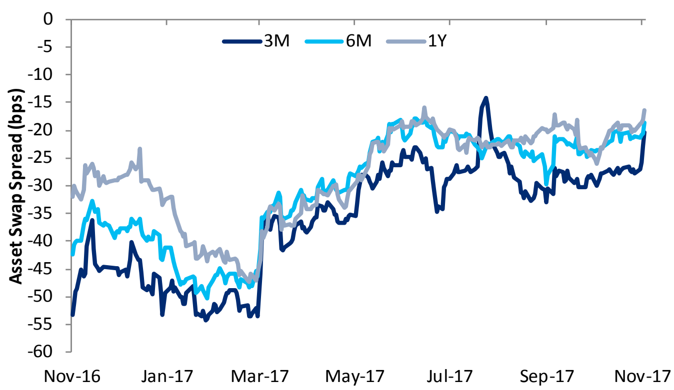
Appendix V: Front End Monitor

Figure 53. Basis monitor

Expiry	Tenor	3m LIBOR - OIS 11/2/2017	3m LIBOR - OIS 1y Z-Score	3m LIBOR - OIS Regression with 2y Swap Spreads Correlation	Beta	Residual	3s1s LIBOR 11/2/2017	3s1s LIBOR 1y Z-Score	3s1s LIBOR Regression with 2y Swap Spreads Correlation	Beta	Residual	6s3s LIBOR 11/2/2017	6s3s LIBOR 1y Z-Score	6s3s LIBOR Regression with spot 6s3s Correlation	Beta	Residual
3m	3m	12.7	-1.3	33%	0.60	-7.8 (-1)	5.0	-1.2	23%	0.33	-6.4 (-1)					
6m	6m	21.8	-0.4	29%	0.46	-0.8 (-0.1)	8.6	-0.8	23%	0.28	-3.1 (-0.6)	11.3	-0.8	89%	1.24	-1.8 (-0.7)
1y	1y	23.3	-0.6	33%	0.43	-1.7 (-0.3)	10.0	-0.6	26%	0.24	-1.3 (-0.3)	12.0	-0.6	87%	0.95	-0.4 (-0.2)
2y	1y	26.6	-0.5	37%	0.37	-0.7 (-0.2)	9.9	-0.5	33%	0.22	-0.4 (-0.1)	12.7	-0.3	84%	0.60	0.7 (0.4)
3y	1y	28.0	-0.7	42%	0.34	-1.2 (-0.4)	9.2	-0.4	39%	0.19	-0.1 (0)	13.5	0.2	78%	0.35	1.3 (1.1)
4y	1y	30.1	-0.8	52%	0.36	-0.8 (-0.3)	8.4	-0.5	43%	0.15	-0.1 (-0.1)	14.4	0.8			
5y	5y	35.5	-0.1	77%	0.49	2 (1.1)	6.0	-1.0	52%	0.10	-0.4 (-0.5)	16.9	1.5			
15y	15y	40.3	0.3	84%	0.59	3.5 (2)	10.4	-0.8	55%	0.43	-1.1 (-0.4)	13.1	-0.8			

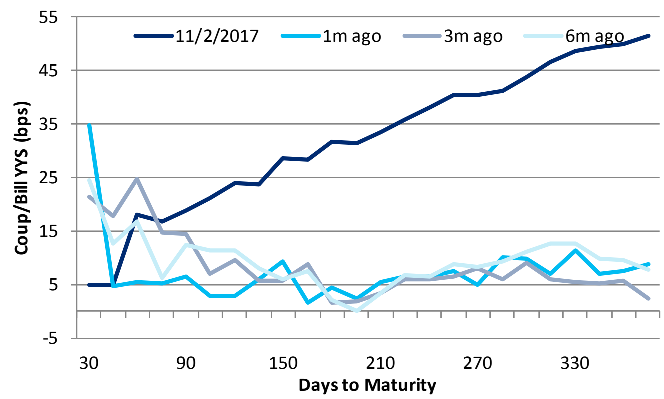
Source: Citi Research, +ve residual value suggests that the basis is wide, -ve suggests that the basis is tight. Value in parenthesis is the standard deviation of the last value compared to its 1-year history.

Figure 54. Historical time series of ASW of OTR 3m, 6m and 1y bills



Source: Citi Research

Figure 55. Term Structure of Coup/Bill Yield Spread at different times



Source: Citi Research

Figure 56. Eurodollar curve monitor

Curves	11/2/2017	Z-scores 1m	6m	12m	Regression* Correlation	Beta	Residual
Eurodollar Futures							
Z7/Z8	41.8	0.3	1.5	0.4	93%	0.51	-0.5 (-0.2)
Z8/Z9	19.9	-0.1	-0.4	-1.0	80%	0.22	-6.4 (-1.9)
Z9/Z0	12.8	-0.4	-1.7	-2.1	43%	0.06	-6.1 (-2.2)
Z0/Z1	13.8	-0.5	-1.8	-1.9	1%	0.00	-3.8 (-1.9)
Z1/Z2	13.3	-0.8	-2.0	-1.3	-61%	-0.05	-2.6 (-2)
Eurodollar Packs							
White/Red	30.5	-0.3	0.7	-0.3	90%	0.38	-5.1 (-1.5)
Red/Green	16.5	-0.2	-1.0	-1.5	72%	0.15	-6.7 (-2.1)
Green/Blue	13.4	-0.4	-1.7	-2.1	30%	0.03	-5.1 (-2.1)
Blue/Gold	13.7	-0.7	-1.9	-2.0	-18%	-0.01	-3.6 (-2.1)
Gold/Purple	12.7		-1.7	-0.8	-74%	-0.06	-1.9 (-1.7)
Constant Maturity Eurodollar							
1y/2y	21.8	-0.2	-0.5	-1.0	68%	0.56	-19.5 (-2.5)
2y/3y	14.1	0.0	-1.4	-1.5	53%	0.18	-11.4 (-2.1)
3y/4y	14.5	0.0	-1.5	-1.7	21%	0.03	-4.8 (-1.8)
4y/5y	13.5	-0.7	-2.1	-2.0	-11%	-0.01	-4 (-2)

Source: Citi Research
*Notes: 1. Regression of each curve is against the longer leg of the curve. –ve residual value suggests that the curve is too flat and +ve suggests it is too steep.
2. Constant Maturity Eurodollars are computed using linear interpolation between Eurodollar futures.

Figure 57. Eurodollar fly monitor

Flies	1:2:1 Butterflies 11/2/2017	1y Z-score	Correlation	Beta	Residual	PCA Butterflies 1y Z-Score	Residual	Weights
Eurodollar Futures								
Z7/Z8/Z9	21.9	1.8	85%	0.28	7.3 (2.6)	2.4	7.8	1.3:2:1.1
Z8/Z9/Z0	7.1	0.1	95%	0.18	0 (0)	1.0	1.3	1:2:1.2
Z9/Z0/Z1	-0.9	-1.3	81%	0.07	-2.2 (-2)	-0.8	-0.6	0.9:2:1.2
Z0/Z1/Z2	0.4	-1.0	66%	0.05	-1.3 (-1.1)	0.5	0.4	0.8:2:1.3
Eurodollar Packs								
W/R/G	14.1	0.9	93%	0.24	2.6 (1.5)	1.4	2.6	1.2:2:1.1
R/G/B	3.1	-0.5	93%	0.13	-1.4 (-1.3)	0.1	0.1	0.9:2:1.2
G/B/Go	-0.3	-1.1	75%	0.05	-1.5 (-1.4)	0.3	0.2	0.8:2:1.2
B/Go/P	1.0	-1.5	65%	0.04	-1.8 (-1.6)	-0.3	-0.3	0.7:2:1.3
Constant Maturity Eurodollar								
1y/2y/3y	7.7	-0.3	82%	0.35	-7.4 (-2.4)	-0.3	-0.6	0.9:2:1.3
2y/3y/4y	-0.4	-1.1	72%	0.17	-6.7 (-2.2)	-0.7	-1.1	0.7:2:1.4
3y/4y/5y	1.0	-0.5	72%	0.05	-0.9 (-0.9)	0.7	0.5	0.9:2:1.2

Source: Citi Research, W=White, R=Red, G=Green, B=Blue, Go =Gold and P=Purple
Notes: 1. Correlation, beta and residuals are computed by regressing the fly against its belly. –ve residual value suggests that the fly is rich, +ve suggests that it is cheap.
3. Note that PCA butterflies are created such that there is no correlation and beta with belly of the fly.

Appendix VI: Event Calendar

Figure 58. September 25 2017 – October 27 2017

13	14 Small Business (Oct) **Producer Price Index** Final Demand: Sep 0.4%, Oct(E) ExF&E: Sep 0.4%, Oct(E) Auction 3 & 6 Mth. Bills Auction 1 Mth. Bill	15 Mortgage Applications **Retail Sales** Total: Sep 1.6%, Oct(E) Ex Autos: Sep 1.0%, Oct(E) **Consumer Price Index** Total: Sep 0.5%, Oct(E) ExF&E: Sep 0.1%, Oct(E) **Empire State Manufacturing** Sep 24.4, Oct(E) **Real Earnings (Oct)** **Business Inventories** Aug 0.7%, Sep(E)	16 **Jobless Claims 11/11** **Import Price Index** Total: Sep 0.7%, Oct(E) ExPetro Sep 0.3%, Oct(E) **Industrial Production** Sep 0.3%, Oct(E) **Capacity Utilization** Sep 76.0%, Oct(E) **Housing Market Index** Oct 68, Nov(E) Ann. 2-Yr. Note Ann. 5-Yr. Note Ann. 7-Yr. Note Auction 10-Yr. TIPS(r)	17 **Housing Starts** Sep 1,127K, Oct(E) **Building Permits** Sep 1,215K, Oct(E)
20 **Leading Indicators** Sep -0.2%, Oct(E) Auction 2-Yr. Note	21 **Existing Home Sales** Sep 5.39M, Oct(E) Auction 1 Mth. Bill Auction 3 & 6 Mth. Bills Auction 12 Mth. Bill Auction 5-Yr. Note	22 Mortgage Applications **Jobless Claims 11/18** **Durable Goods** Total: Sep 2.2%, Oct(E) ExTrans: Sep 0.7%, Oct(E) **Reuters/Michigan Sentiment** NovP , NovF(E) **FOMC Minutes Released** Auction 7-Yr. Note	23 **Thanksgiving Day** **NYSE Holiday** **Federal Gov't Holiday**	24

Source: Citi Research

Appendix A-1

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